Visions In Mobility

Proceedings

INTERNATIONAL MOBILITY CONFERENCE 7

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Eileen Siffermann

INTRODUCTION

"The aim of the International Mobility Conference is to further the level of expertise and knowledge of mobility instructors through an international exchange of ideas and information."

The 7th International Mobility Conference (IMC 7) was held at the University of Melbourne, Australia from 31st January - 4th February 1994. The conference was attended by 250 delegates from 26 countries.

IMC 7 participants in their evaluation of the conference were enthusiastic in their responses concerning the importance of the information they gained and the opportunity IMC 7 provided for the exchange of ideas. Many commented on the valuable experience of networking internationally.

IMC 7 took place over five days including a half day for visiting relevant agencies. Plenary sessions were conducted each morning to bring all the participants together, with three concurrent sessions commencing after morning tea. Each session had a theme which the presenters addressed. In addition, participants were given the opportunity to attend informal workshops on themes which provided an opportunity to discuss issues, form working parties and make recommendations to be followed up at IMC 8 in Norway.

Two one day satellite conferences were held at the completion of IMC 7: "International Personnel Preparation Centers" and "Learned Helplessness in Children with Visual Impairments". Both were well attended. A four day training program for Instructors in the use of the Sonic Pathfinder was also conducted.

This Book of Proceedings has been produced from the material submitted by presenters of papers and posters. The papers of Keynote Speakers are given first in the order in which they were presented. The remaining papers have been grouped into various themes. Since the value of this book will be as a reference, a comprehensive table of contents and author index has been included.

DEDICATION

Shortly after IMC 7 we were saddened to hear of the death of one of the Keynote Speakers and joint co-ordinator of the satellite conference, Dr. Everett Hill. For his many years of service internationally to the profession of Orientation and Mobility and more recently for his valued support at IMC 7, we dedicate this book of proceedings as a small token of our esteem.

GAYLE CLARKE
TONY HEYES

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Presentation by David Blyth - President of the World Blind Union
Opening IMC7 Melbourne 31/1/1994

I take this opportunity to speak on the ramifications of orientation and mobility to blind persons, its origins and some thoughts for the future.

Orientation and mobility and braille are the two most significant factors in rehabilitation and training of blind persons: These two areas of expertise are distinct to blind people and have no relevance to other persons with disabilities. In fact they mark the cornerstone of successful rehabilitation or training programs for blind persons.

Orientation and mobility had its genesis in the number of blind american servicemen during World War II. At a veterans' hospital these blinded GI's were assembled and the United States army hired sighted persons with experience in teaching blind people to help including a braille teacher and a wrestling teacher from schools for the blind in the area. These GI's were young, fit and restless so a programme of physical education in a gym was undertaken to burn off some of their surplus energy. They were taken to and from the gym by sighted persons. However one day the sighted persons were attending a meeting and when they returned to collect their charges to take them to the gym, they were gone. The gym was situated down three flights of stairs in another part of the building and eventually the GI's were located happily working away in the gym. Upon inquiry about how they negotiated their way from their rooms to the gym, the sighted guides were told "it was easy - we got a broom and one of us pushed it along while the others followed in a chain. When the broom fell to the first step, we felt the banister, followed down and repeated this until we reached the gym."

From this came the basis of orientation and mobility training - leading to the use of the long cane.

I tell this story to illustrate that it was blind people themselves who found the key to their mobility problems. However today blind people have little if any input into the training and employment of orientation and mobility instructors.

It is interesting that this has been totally hijacked by the professionals and it has become almost an exercise in academia. In most countries including Australia, blind people are debarred from the profession of orientation and mobility instruction.

In the United States of America many totally blind instructors who are not recognised by the profession are working effectively in specific rehabilitation units. These instructors themselves and their trainees are amongst the most mobile blind people I have ever met. It is interesting to note that these people use longer canes than is standard within the profession. The move from canes of 40" (1 metre) was initiated by blind people themselves who found that the shorter canes inhibited the speed they could walk at. Through experience and education many of these blind-instructor-trained users of canes were using canes in excess of 60".

My challenge to this conference is that you reverse the trends of the past and include blind people and organisations of blind people in the development of courses for training orientation and mobility instructors, and that you insist that blind and visually impaired people can become instructors themselves. For it is only in this way that you can ever achieve your objective of developing in blind persons the skills that they require so that they may take their equal place in society.

It does seem a paradox that in all the literature on rehabilitation of blinded persons we strive for normality and equality and yet in a profession which forms one of the keystones of that process, blinded persons are denied access.

Again, my challenge to this IMC7 is to step away from this restrictive and totally discriminative practice so that blinded people in the future may gain the fullest and most satisfying training to assist them to achieve their personal goals.

INVENTING A FUTURE FOR MOBILITY

J.Keith Holdsworth

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For the title of this paper I am indebted to David Suzuki who points out the uniquely human ability to conceive and invent a future and thus to gain the opportunity for choice of action. He also reminds us of our tendency to live without challenge to what we consider to be "Sacred Truths" in our beliefs and values systems.

This paper briefly reviews the development and practice of mobility, questions some of our "Sacred Truths" and indicates possible alternatives for the future of mobility.

A former Australian Prime Minister once described the Guide Dog service as being one of the most important social inventions of our time. The development of Orientation and Mobility techniques must surely be of similar importance and each shares with Braille the distinction of being designed exclusively for the use of people who have a vision disability.

The strong thrust to provide services in integrated or generic settings has had profound effects not only on the ways in which people are provided with service, but also in reducing the levels of specialisation of those services. Because mobility has an application to virtually every person with a vision disability, because of its specialisation, and because of its broad availability, I consider that there is a powerful argument to be made that the profession is uniquely positioned for further development.

The history of mobility can be seen in three main parts extending over the past 45 years or so. The first from the early tentative beginings in the

United States Veterans Administration, to the establishment of University based couses for instructors in the early 1960s. The second to the mid 1970s was one of expansion in the United States and to each continent, and the third to the present time seems to have been one of technical and professional consolidation. This growth and development gives mobility its special position and its special responsibilities.

The techniques of mobility which we now take for granted, were the result of brilliant innovation, repeated refinement, and careful translation into a systematic method. Its introduction broke completely new ground enabling the "magic" of independent mobility previously demonstrated by only a few, to be available to and useable by all.

Those techniques were initially designed for war veterans who constituted a rather special group. In general they were young, fit, disciplined, motivated and with high expectations for themselves. As mobility has become more available to the wider population, the characteristics of people requesting tuition have changed greatly. For example in Australia over 75% of tuition is provided for people over the age of 65. Their mobility needs are necessarily very different from the original group of veterans. It is unusual now for instructors here to be asked to provide that full range of techniques to more than a handful of people in any one year.
As most courses for the preparation of instructors require competance in that full range of techniques, one could ask whether that is the most appropriate weighting of course time. Complex cane skills are still vital for that relatively small group who have extensive mobility expectations, but perhaps the teaching skills are not required by every instructor, but could be available through an additional optional course module,
Perhaps this can be the first challenge to our "Sacred Truths".

Another evident characteristic of people seeking mobility tuition, is that almost all see something, and this has implications for instructor preparation and practice. Cane skills can be used to fill in gaps in vision ability as well as replacing it. The "Sacred Truth"of blindfold training has diminished significantly, but perhaps some remnants remain.

A study carried out some years ago by Royal Guide Dogs indicated that many clients did not continue to use their cane skills after tuition. They had not lost those abilities, they just chose not to use them. There is a good deal of informal evidence to suggest that this is quite common. One might ask "Why?" One possible answer which appeals to me is that people apply a sort of cost-benefit analysis to their activities. Mobility has a cost in terms of effort, stress and risk.
Measuring the effects of mobility tuition only by a skill scale may be telling only part of the story. There may be other gains or satisfactions which are not directly related to skills. A study in which I am involved aims to examine some of these potential tuition effects.
Could we take the measurement of tuition results by a method in addition to a skill scale as being another change to one of our "Sacred Truths"?

It says much for the soundness of the original techniques that they have accomodated the great diversity of mobility objectives of people, but this diversity constantly challenges our capacity for invention. If outcomes other than skills become recognised as being important, then instructors may need to broaden their professional abilities to recognise them and to enhance those outcomes which are high on the list of client desired objectives.

Peter Drucker in the "New Realities" speaks of non-profit organisations - and many vision disability services are provided through those -

as being part of a sector of organisations whose common objective is "human change". Human Change organisations include health and educational institutions as well as that newer group of community organisations which are involved with self-help, self learning and health promotion. Mobility may be able to strengthen and deepen its teaching strategies by considering some of the more successful practices and experiences from this wider human change sector. It may not be a "Sacred Truth", but beneficial change may come from outside the field as well as from within it.

From time to time we have all expected miracles from some new development. Often our expectations have been unrealistic. From the introduction of the Sonic Torch about 1960, a range of electronic mobility devices has been produced including the Laser cane, Russell Pathsounder, Mowat Cane and Mowat Sensor, the Sonic Guide and most recently the Pathfinder invented by Dr.Tony Heyes and about which you will hear much more during this conference.

In the light of all these developments it may appear curious that none is in widespread use. Cost is undoubtedly a factor in this, cosmetics may be another. Perhaps in some cases we have failed to understand either the designed purpose of the instrument or its potential.

Now we have the potential for adapting hand held Global Positioning Systems, which can indentify a person's position anywhere within a few metres. Even if only a small proportion of people choose to use any of these devices they may be of great value to those people.

The use of purpose built or adapted electronic devices is another area for concentrated specialisation.

In recognising the needs of smaller segments of the field, we also should keep in mind the larger picture. A recent large scale survey carried out by the Royal National Institute for the Blind in London, indicated that there are many more people potentially needing service than previously

estimated. Earlier studies in the United States and Australia tended to yield similar conclusions. At the same time the world is faced with reducing availability of resources. Put bluntly, we have to do more with less.

Now may be the time to return to another of Peter Drucker's observations. In his analysis of Human Change organisations, Drucker draws attention to the changing ways in which volunteers are being used." Unpaid staff" has become a new title and a new role for former volunteers. These people act in every way as staff excepting that they are not paid. This has led to stronger organisational commitment to training and accountability. They are viewed as valued work colleagues and in turn the unpaid staff give firm commitment to professional values and responsibilities.
Before this notion is rejected out of hand, let's consider a little. In Australia and in other countries, most requests for mobility tuition are for relatively basic skills. Typically these include self protection, sighted guide and low-risk cane techniques. Teaching others to teach these skills has long been a general practice. Teachers, para-medical workers, family members and close friends are all examples of people who have been taught to teach these basic skills. This approach contains the possibility of developing the role of the mobility instructor to be a teacher of teachers at the same time as allowing more specialisation, and should help us to do more with less.
When we reflect that each of these suggestions has been introduced already, somewhere, putting them into practice may not be so daunting. However what is often lacking is the integrated structure and coordinated strategy to provide a comprehensive approach to the effects of vision disability together with an overarching understanding of what constitutes relevant services.

In considering a future for mobility, we should recognise that mobility does not exist in

isolation. It is a human service - a human change service on which many other aspects of life impinge.
Designing a future requires assumptions to be tested, commonalities determined and a broad perspective adopted.

I have questioned the state, practice and future of mobility, and argue for a significant review and for some possible redesign and restructure. To restate the basic premises for my argument:

Integration whilst having some clear benefits, is leading to the loss of essential specialisation.

We need to reach more people with appropriate services without a proportional increase in resources.

Mobility as the specialisation with the widest application has special opportunities and responsibilities.

It has the opportunity to be the core of a stronger and repositioned specialisation - providing that it can take an initiative to adapt, change and develop.

It has the responsibility to reexamine the real needs of people with vision disabilities, to reassess its role, and its ability to meet those needs in a flexible, relevant and efficient way, to consider how best to prepare personnel and how to evaluate the impact of service on an individual.

I have further suggested that mobility should ensure that it has an appropriate ecological fit with its total environment.

The future of mobility may well be different in different countries but we all have to decide whether we contine to merely "mind the shop" or whether we "scan the horizon" (as Rick Slaughter says of Education Futures).

I would argue that it is now time to scan the mobility horizons and to reinvent its future.

SENSORY ALTERNATIVES AND THE VISION IMPAIRED

A. D. Heyes.

Royal Guide Dogs Associations of Australia.

Engineers find it hard to believe that here and now, in these last days of the twentieth century, blind people are still dependent on dogs and canes for their mobility. They argue that the problem, in principle, is straight forward:

> We, the sighted, derive most of our information via our sense of vision. The reason that blind people have difficulty getting around is their lack of this sense of vision. Therefore, what we should do is to develop devices which gather visual information, that process this information in a way that it can be perceived by the blind person's remaining intact senses and utilise these senses to deliver the information to the central nervous system.

Developing this philosophical approach further the engineer would draw attention to the fact that the central nervous system is remarkably adept at dealing with complex codes; even small children can be taught to read and to speak. In essence the engineer is advocating the development of a sensory substitution system. The 'Holy Grail' of artificial vision.

Well, what are the results? How threatened should we rehabilitation scientist and practitioners feel? It is true that medical developments in the treatment of vision impairment have been spectacular. Many conditions which, in the past, led to blindness and dependence on rehabilitation services are rarely encountered. Are we about to be rendered totally redundant by some bio-technological breakthrough which will enable the blind to see with artificial eyes?

Optical systems in which a television camera is used to capture an image and pass the output to electrodes planted in the brain have been developed in numerous centres during the last two decades. All make use of the experimental fact that the electrical stimulation of a point on the visual cortex produces a perceived flash sensation in the visual field. By mapping the relationship between the stimulus site and the resulting flash, systems have been tailored to suit individual recipients. In not one case of this surgical procedure has a patience emerged with anything approaching functional vision. The moment the complexity of the visual scene requires more than six stimuli to be operating simultaneously the subjects report a 'white out' condition. Much of the discussion relating to these techniques has focussed on the difficulty of installing and maintaining electronic equipment within the hostile environment of the human body. This would seem to miss completely one of the most fundamental points. David Hubel and T. N. Weisel showed with their classical

work on cats that a considerable amount of visual processing takes place in the early stages of the visual pathway. Hubel and Weisel shared the Nobel prize for the discovery of neurones in the retina of cats which responded to the *shape* and *motion* of visual stimuli. In view of this it would seem remarkably naive to suppose that a simple two dimensional mapping of the visual scene on to the visual cortex would produce anything other than confusion. Sadly this type of surgery is still practiced.

The most recently reported single sense system to come to my attention is the silicon retina. This envisages a surgical technique in which the light detection component parts of the retina are replaced by electro-optical transducers. Clearly putting the prothesis at an early stage in the visual pathway encourages one to believe that maximum use will then be made of those innate processing capabilities. But, are they innate? There is abundant evidence to suggest that the opposite is true. The development and maintenance of visual processing functions within the central nervous system would seem to depend on the continuous availability of a rich visual input. Silicon retinae, if they did work, would only be suitable for recently blinded clients with intact visual pathways.

Artificial vision systems which display information to a clients other senses are less intrusive since they do not involve surgery. Considerations of channel capacity and response time have limited displays to the tactile and the auditory senses. The senses of smell and taste seem not to offer a suitable channel.

Elaborate two dimensional 'picture' displays were the subject of considerable research in the 70s and 80s particularly at the Smith Kettlewell Eye Research Institute in San Francisco. I was fortunate to be part of the team working on this project at the time it was undergoing a transition from a chair based system to a portable mobile system. The 400 mechanical solenoids forming the 20 by 20 array of stimulators on the back of the chair was replaced by a 20 by 20 array of small electric shock stimulators sewn into a body stocking and positioned on the stomach. Detailed work had determined electrical parameters which cause a mild electric shock to be perceived as a tickling sensation. These same parameters are used today in the Tickle Talker, the finger stimulating version of the Melbourne Bionic Ear. The training given to clients using the chair transferred to the body stocking in spite of the fact that a different body location was being used. Totally blind users could be taught to recognise simple shapes and to get an appreciation of parallax. There seemed to only two problems. The technical one of maintaining a good electrical contact with the skin; in the end electric shock stimulation was abandoned in favour of miniature low power solenoid sewn into the body stocking. And the psychophysical one of resolution. The ability of the surface of our skin to recognise patterns varies greatly depending on location. Only the fingertips, the tongue and the forehead offer high resolution surfaces. The surfaces which are available for use, the stomach and the back are poor in this respect. The really interesting thing about this research is that the central nervous system **did** recognise the information as being very similar to vision. It was, however, unable to cope with the quantity of information necessary to be useful. In spite of the very positive results reported above research in this area has all but petered out.

Our sense of hearing has a large channel capacity. We are able to appreciate a wide range of frequencies and a rich variety of sound 'colours'. Artificial vision systems based on auditory displays are very common. Some have optical systems to collect information; optical *front ends.* Some rely on ambient light, some send out beams of light, usually invisible, infra-red light, and look for reflections. Other devices use high frequency sounds to probe the environment; ultra-sonic *front ends.* With very few exceptions they attempt to embody the engineers' philosophy, that is to say, they try to give the user a full and comprehensive 'picture' - albeit by means of sound - of the outside world. The generic term coined to describe these multi-modal, information rich devices is *environment sensors.*

In the early 70s the psychologist moved in on the act. Despite the best efforts of engineers the results were not good. Vision impaired people were not embracing electronic travel aids with alacrity. Evidentially something was wrong.

Most psychologists identified the problem as one of inadequate training. Devices which provided an information rich display of the world *would* be difficult to understand but, provided the correct training schedule could be worked out, they would be successful. One psychologist, the late Alfred Leonard, took a very different approach. Leonard was the first academic to get out on the streets and observe just what these vision impaired people (VIPs) actually did. His observations led him to conclude that many VIPs were extremely adept at getting around without any fancy gadgets. Furthermore when given devices which displayed information about objects at a distance the successful users were the people who were able to ignore the vast majority of the information and 'selectively attend' to the information which was relevant to their needs. Leonard set up the Blind Mobility Research Unit at Nottingham University in England and I was fortunate to join his team in 1970. As a physicist I was tarred with the engineers' brush but under the influence of Leonard I changed.

Leonard developed an alternative philosophical approach to the design of electronic travel aids for the vision impaired. Sadly he died before the first embodiment of his ideas was developed. Leonard argued that we should focus attention on the information needs of the mobile blind pedestrian and seek to provide him or her with just that information. In other words, we should NOT attempt to give a picture of the world, but rather, small items of information which are relevant to the user's current needs. Furthermore one should give this information in a form which did not impair the use of normal cues. Leonard experimented by walking close behind blind pedestrians and whispering instructions. He found that a very small vocabulary was sufficient to produce excellent mobility. Leonard saw the development of a device which would perform this function would be an important goal for his unit. Such a device would be a secondary mobility aid, used in conjunction with a Long Cane or a Guide dog. He realised that the goal would not be reached easily or quickly, rather it would evolve from a research program.

Leonard's research program involved a preliminary stage during which objective measures of mobility performance were developed. This would be followed by a development stage during which device would be proposed, built and evaluated in an iterative process leading, hopefully, to an embodiment of his concept. Sadly Leonard only lived to oversee the first part of this process.

I gave the name Sonic Pathfinder to my attempt to incorporate Leonard's ideas into a practical device. As Leonard had predicted it was slow to evolve. Over the years it has changed almost beyond recognition but never due to a whim of style or fashion. Always as a result of an evaluation or 'feedback' from the field. This is the first electronic travel aids for the blind to incorporate the techniques of 'artificial intelligence'. Just in the way that Leonard when padding along behind the blind pedestrian so many years ago had first to decide what was relevant to whisper in his depleted vocabulary so the Sonic Pathfinder 'decides' what is relevant by estimating the walking speed of the user and calculating the time to collision for the objects it detects. Only if the internal microprocessor concludes that a collision will take place within 2 seconds is the user informed of the presence of the object. No, the Sonic Pathfinder does not whisper words, we have tried that, its boring, we prefer a display comprising the notes of the musical scale. The Sonic Pathfinder does not tell the VIP much but what it tells is relevant. I was particularly thrilled a year ago when, after giving a paper to a room packed with the world's leading vision scientist, David Hubel - yes, the very same Nobel prize winner - put on the Sonic Pathfinder, closed his eyes and while darting between trees on the Australian National University campus, called to his colleagues, "Come on, try it, its fantastic."

What of the future? The Sonic Pathfinder is the beginning of a new direction. More advanced devices will be developed. I am willing to bet that they will fail unless they are the product of a collaboration between the scientist, the mobility practitioner and the client. In fact the practitioner will be the lynch pin in the team. And what of the Holy Grail? Maybe, one day, but not in our lifetimes. One no longer hears that confident clarion cry, "Twenty twenty vision by the year 2020".

VISUAL SCIENCE AND ITS RELEVANCE TO O&M

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Vision rehabilitation first became a formalized, interdisciplinary profession in the 1950's when the Industrial Home for the Blind published the first model of low vision services. (Industrial Home for the Blind, 1957). Historically, the greatest strength of this model has been its interdisciplinary nature. Traditionally, the members of the interdisciplinary team were considered to be optometrists or ophthalmologists, orientation and mobility specialists, rehabilitation or special education specialists, and psychologists or social workers. Each of these professions has contributed its expertise to develop the clinical skills employed in vision rehabilitation.

While not as widely recognized within the vision rehabilitation community, visual scientists have made many important contributions. Visual science, like low vision, is a broadly based, multidisciplinary undertaking with the unifying thread of seeking a better understanding of how we see the world around us. Many of the professions that contribute to visual science overlap with the disciplines traditionally associated with low vision (see Table 1), however, visual science is primarily a research based science, while low vision is a clinical based profession.

Visual science has made major contributions to low vision. Many of the clinical tests used in low vision clinics were developed by visual scientists; for example, Arden Plates and low contrast visual acuity tests were developed by visual scientists. Even some of the devices used in low vision have been derived from visual science research. The Pocketscope night vision aid, for example, was originally developed by the U.S. military to meet its need for improved night vision for pilots and others (Coursey, et al, 1972). The first commercial version for night blind travelers

was developed through the efforts of Berson and his colleagues (1973). Even though other devices have proven to be more generally useful (Morrissette, et al, 1983), the Pocketscope was an important advance and the first hand-held electronic display produced for the visually impaired.

Table 1. Professions that contribute to visual science and which also have relevance to orientation and mobility.

Optometry	Ophthalmology
Psychology	Physiological Optics
Visual Psychophysics	Visual Perception
Neuroscience	Gerontology
Computer Science	Neural Networks
Cognitive Science	Research Methodologies

When we consider low vision research, including visual science, we often think of low vision aids. These devices are generally widely publicized in the literature and are quite visible when used; whether they are filters, telescopes or bioptics. There are, however, other orientation and mobility needs that visual science research has, and will continue, to address. Listed in Table 2 are some of the needs relating to assessment and training issues in mobility. For example, an individual's visual acuity has very low correlations with either his/her near or distance functional vision. However, visual scientists have shown that if one measures magnification reserve needs (which is in large part is derived from visual acuity measures) that a much better relationship to near visual function can be obtained (Whittaker & Lovie-Kitchin, 1993). Similarly, clinical visual field measures have shown only poor correlations with mobility performance, however when combined with other measures (i.e., contrast sensitivity) their predictive ability improves substantially (Marron & Bailey, 1982).

Visual science also encompasses the perceptual and cognitive factors relating to vision and consequently is relevant to functional assessment in low vision. For example, recent visual science studies have shown that attentional visual fields seem to be strongly correlated with motor vehicle driving ability for elderly and visually impaired drivers (Ball, et al, 1993). Perceptual elements of vision have also been shown to have strong correlations to distance visual performance of individuals who are partially

sighted (Dodds & Davis, 1989). Such studies have obvious implications for assessing visual functioning in orientation and mobility, and they may ultimately prove to be important components in developing a theoretical model of the visual perceptual hierarchy in low vision (i.e., Barraga & Collins, 1979; Overbury, et al, 1989).

Table 2. Example contributions from visual science that relate to orientation and mobility.

Refine Concepts Useful in Rehabilitation

- Visual Acuity .... Magnification Reserve
- Visual Field .... Functional Field of View
.... Attentional Field of View
- Contrast Sensitivity Function .... Contrast Reserve

Develop New Rehabilitation Concepts and Tools Derived

- Perceptual Hierarchy
- Luminance Enhancement
- Spatial Frequency Enhancement
- Spatial Remapping

The most recent developments from vision science relating to low vision are the investigation of visual enhancement systems which may tailor visual environmental displays to the visual capacities of the individual. In these schemes the environment is viewed through a television camera and the visual image is modified by a computer, which then displays the resulting image on a television screen. One enhancement technique is spatial frequency enhancement in which certain frequencies are selectively enhanced (Peli, 1992). In another technique the computer remaps the entire image around a scotoma (Loshin & Juday, 1989). The resulting image is distorted, but contains all visual information for viewing by the remaining retina. Until recently such enhancement strategies were impractical in an applied setting since they required relatively large cameras, television displays, and computers. In 1992 the Low Vision Enhancement System (LVES) prototype was unveiled (Massof & Rickman, 1992) and for the first time it was has become possible to clinically test the various enhancement strategies for improving mobility performance.

The contribution that visual science can make to improving low vision orientation and mobility assessment and devices is potentially enormous. For example, visual science may ultimately lead to a comprehensive theory of low vision mobility. However, the degree to which the promise of visual science meets the needs of orientation and mobility will in large part be determined by the degree of interdisciplinary cooperation that can be achieved. Without an active partnership the potential contribution of visual science to orientation and mobility will never be realized.

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THE AUDITORY SKILLS NECESSARY FOR ECHOLOCATION

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People who are visually impaired gain much useful information for independent trave by utilising reflected sound to detect obstacles in their path (obstacles perception) or surfaces identifying changes in reflected sound returning from obstacles.

Preliminary studies have hypothesised tha reflected sound must be in frequencies of 10,000 Hz and above to effectively provide information about obstacles and surfaces. One study has also indicated that use of reflected sound depends upon the ability to detect small fluctuation in decibel level (i.e. small changes int he intensity or "loudness" of a sound). Previous studies, however, have not conclusively established these hypotheses. Additionally, audiological tests currently do not exist to predict performance in the use of reflected sound.

Data collected by this study served two purposes. First it investigated the two theories that account for the ability to effectively use reflected sound. Secondly it established new components for an audiometric test battery for the blind persons that will serve to predict success with obstacle perception and echo detection. Such indicators could help orientation and mobility specialists determine if extended practice with these skills might improve performance or if ti would be a little consequence.

With these objectives a correlational study was conducted to compare performance in echolocation, with ability to detect small fluctuations in intensity levels at the lower frequencies, and with high -frequency pure tone air conduction hearing thresholds.

Questions to be investigated:

* Is there a significant positive correlation between a blind individual's pure tone hearing thresholds at the frequencies of 80,000 Hz, and 12,000 Hz and the individual's ability to demonstrate use of echolocation to detect obstacles in one's path).
* Is there a significant positive correlation between a blind individual's pure tone hearing thresholds at the frequencies of 8,000 Hz, to 10,000 Hz and the individual's ability to demonstrate use of echolocation to detect openings at one's side such as open doorways in a hallways).
* Is there a significant positive correlation between a blind individual's ability to detect intensity changes as small as 1 decibel or a fraction of a decibel (.2) in pure tone stimuli and the individual's ability to demonstrate use of echolocation to detect obstacles in one's path.
* Is there a significant positive correlation between a blind individual's ability to detect intensity changes as small as 1 decibel of a fraction of a decibel in pure tone stimuli and the individual's ability to demonstrate use of echolocation to detect openings at one's side.

Test of Obstacle Perception, Echo Location, and Hearing Abilities:

Obstacle Perception Test: Subjects walked towards a masonite board and identified its presence as early as possible. They next walked forward as close to board as possible without touching it. Measurement of the distance between the subject and the board were taken for 18 trials.

Doorway Location Test: Subjects walked down a hall next to the wall while holding onto a guide. Subjects were asked to indicate each time they passed an opening. Sixteen trials were supplied and the results were recorded as the total figure of correct response.

Audiometric Tests: During the audiometric portion of the experiment all subjects were placed in an air conditioned sound treated room. Subjects were asked to make subjective responses to auditory stimuli (eg. pure tones at 8,000 Hz, 10,000 Hz, and 12,000 Hz. They indicated when they noticed a jump in loudness. Increments included 1 dB, . 8dB, .6 dB, and .2 dB.

Results:
The data from this study were analysed to determine if correlations existed between the subject's performance in echolocation tasks and specific auditory skills that were evaluated in the test battery. The Parson Product-Moment Correlation Coefficient was used to asses the relationships.

There were many significant correlations between the DCI at 500 Hz and obstacles performance. There were also significant correlations between the DCI at 2000 Hz and obstacle performance. There were low and even negative correlations between the pure tone thresholds on the upper frequencies and echolocation. Incidental to this study it is interesting to note that there is a positive correlation of +.65 between performance on detection of door openings and detection of obstacles indicating tha both tasks are a related function.

In general the results find that our audiometric test battery is correlated with performance in echolocation. The two most significant findings were (1) that a correlation of +.79 and +.68 existed at the .6 dB increment level between the DCI and echolocation for Obstacles and doors respectively at 500 Hz, (2) that there were no significant correlation between the thresholds for the upper frequencies and performance on detection of obstacles or doorways. It appears that the small changes in intensity in the frequency of 500 Hz may be associated with good performance. The DCI at the .6db increment may hold the potential to serve as a screening tool for performance of echolocation tasks.

Guide dog mobility - the Rolls Royce option? *

Abstract

This paper explores the use of analogy, or word pictures, as a way of describing the mobility enhancement options available to people who are vision disabled.

The effect of guide dog mobility on the social interaction of people with vision based disabilities defies ready description. There is an element of mystery. The uninitiated cannot know its full potential. Reinforcing this apparent 'magic' or fascination is the synergy between the intellect, will and emotion of two different species that is evident in the work of experienced and effective handler-guide dog teams. But there is more to this than just the partnership between handler and guide dog. Effectiveness requires the acceptance of the wider community.

Community acceptance depends on the development of an understanding of the role and function of the guide dog in relation to the handler's self reliance.

The analogy is a communication tool we can use to link the way we feel about guide dog mobility to the way ordinary people feel about their mobility. The best analogies carry strong descriptive power, do not offend the intellect and often employ humour. Wisely used, the analogy can bridge differences in experience to create a common medium for the process of identification which is essential to the development of respect.

The sighted person cannot experience the full potential of guide dog mobility but they need to comprehend its significance before they can respect it. One of the ways we seek to engender the comprehension that is critical to the development of respect is to tap into their dreams of ideal mobility by using an analogy between the guide dog and the 'Rolls Royce'.

But, there is another dimension to this form of communication. People with dysfunctional vision have their own dreams about effective mobility. By drawing an analogy between the white cane and the 'VW' and then comparing it with the guide dog as the 'Rolls Royce' we risk aggravating the frustration presented by the emotional demands of modern urban mobility.

The paper goes on to explore the function and justification for the use of these analogies and attempts to complete the range of word pictures about mobility created by the use of the parallels in the experience of motor transport to describe other options such as the sighted guide and technological aids.

The paper then summarises a series of warnings about the use of analogy. These include culturally inappropriate imagery, emotive overstatement, the demeaning effect of imputed judgements of relative quality and the danger, for clients, of creating status based distinctions between mobility options.

The paper concludes by saying that if

- *we recognise and feature the authority of our clients rather than focussing solely on their mobility vehicles*
- *we identify the particular features of the vehicles we choose to use to describe mobility aids rather than relying on hidden meanings to carry the emotional response*
- *we can create a set of word pictures that together or in sequence produce an ethically sensitive and comprehensive view of all our mobility options[+].*

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+ The opinions expressed in this paper are designed to promote discussion and do not represent the corporate view of any of the organisations with which the writer is affiliated.

How many times have you been asked what its really like to 'get about' with a guide dog?

You might have been asked by a client who is thinking about taking up training in guide dog mobility; a member of the public fascinated by the apparent 'magic' in the co-orinated and integrated pattern of movement they see in the travel of an effective working team; or, a potential donor who is really asking 'what's so special about guide dog mobility that it deserves funding and justifies its cost'.

How many of you have resorted to some variant of this 'industry standard response' -

> 'getting about with a white cane is like driving a VW - but, the guide dog travels like a Rolls Royce'

I expect that at least as many of you cringe as soon as such a complex issue is reduced to a slogan. What we are doing is playing with words. So, I guess that in the absence of a poet or a playwright, a lawyer is as good a player as anyone. I want to explore the effect of playing on these words with you but, first I want to set the scene.

No matter where we live we are all dealing with the effects of continuing social change on the mobility needs of people who are vision disabled.

Safe mobility is a necessary skill gained, at significant personal cost, with the aim of developing and preserving self reliance[1]. Cultural diversity, aggregating populations, unemployment, poverty, urban unrest, multi lane roadways, high levels of ambient noise, phantom sound cues and heavier and faster traffic that travels more quietly than ever before all contribute to the stress and confusion that is part of everyday life and imposes a continuing pressure on maintaining the skills needed for effective mobility.

We all start with the sighted guide. Most of us tend to take up the white cane. Some of us elect for training for mobility with a guide dog. Many of us appreciate the secondary support that can be provided by technological options using sonar or lasers. These, used in combination with a primary mobility vehicle, expand the range of transit information available to us. In summary, we are all seeking a combination that best satisfies our individual preferences and meets the mobility demands presented by our circumstances.

Effective mobility is a process of training and adjustment that integrates our personal resources with the world in which we want to take our part. The aim is to match our needs with our skills so that we can safely satisfy our aspirations.

From our first excursions as people who are vision disabled, encounters with traffic can bring anxiety and apprehension. For many of us, at various times, this state has been characterised by physical responses such as headaches, erratic temper, prickly heat and cold shivers. We are alert but confused by the sounds and smells that only later become part of the patterns of landmarks and clues we use for orientation.

You might recall these sorts of feelings from your first attempts to drive a car. Co-ordination of the clutch pedal with the gear lever while steering and looking out the window for obstacles and moving traffic was demanding. Attention to, and engagement in, the task was essential. The stress was high. Many of you might have preferred to drive a car with an automatic gearbox so you could avoid learning some of these skills.

Our first orientation and mobility instructor is a very important person. S/he initiates the process of social adjustment that is part of learning to accept our limitations while helping us to develop the initiative needed to explore the world and test our limits. The balance to be struck is fine. To be effective, the process of training in

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1 Our intelligence, will power and emotional commitment

mobility must engage our will, emotions and intellect. The personal development that is inherent in teaching us mobility skill places heavy demands on O&M instructors.

Learning to assume control while being guided by a sighted person and then to become gradually more self reliant through the use of the white cane can be both self fulfilling and socially liberating. The sighted guide and the white cane carr represent a choice between the animate and the inanimate vehicles that we can use to 'get about' the town.

From this discussion two strongly related themes emerge

- being in control of our lives

and - be able to 'get about'

We share this drive for self control and social mobility with everyone else. So if we are looking for a common carrier for messages about mobility the vehicles we each use to 'get about' have alot to offer.

If I were to play lawyers word games I might restrict our discussion from now on to the only two sentient mobility options available - sighted guide and the guide dog. I'm not going to, but for many this comparison of 'like with like' would be a logical way of making sure I finish this session on time.

For all but a few of us, the sighted guide fails as a practical long term mobility vehicle. Sighted guides might be caring but they are not always available. They can be easily distracted. Their effectiveness seems to reduce in proportion to the degree of intrusion and inconvenience we come to represent. This can eventually lead to unreliability. If self reliance is the aim, the ease of mobility presented by the sighted guide can be counterbalanced by its heavy social cost.

The value that developed societies place on self reliance confines the use of the sighted guide to the status of being a 'resource to be held in reserve'. As a person who is vision disabled I can say to you that the freedom to be able to transfer control to someone else for a time provides us with the reassurance that we need to be able to drive through the novel, the complex or the overwhelming. Being able to choose to rely on another is an important dimension of self reliance. In situations like this the sighted guide is entitled to command its place as the premier primary mobility aid. In its way it cannot be compared with any other option.

Rather than playing the technicalities like a junior lawyer, lets move on to look at what has become the typical mobility vehicle for VIP's (vision impaired persons) - the white cane.

Well, doesn't everyone here have one - perhaps your first training cane? They're user friendly, relatively cheap to supply, tough, compact, unobtrusive, easy to replace, and damage or disposal carries little emotional cost. As a vehicle, the concept is as universal as that of the 'World car', as long as you don't try to interchange spare parts. The cane has been refined and developed so that it now comes in a variety of models. As long as the primary colour is always white[2], optional extras can include flashing lights, rural tips and laser beams.

If we can accept that the white can is the typical mobility vehicle for VIP's then community acceptance of its function is critical to our integration into ordinary society. Explaining this to the uninitiated is difficult. One of the most popular communication analogies describes the white cane as the Volkswagon(VW) Beetle[3] of blind mobility.

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2 In 1908, Henry Ford launched the tough, reliable Model T Ford, the first mass produced, affordable, popular car, saying 'it comes in any colour you want as long as its black...'

3 Jerome Bureau *'Images of 1001 Cars'* Tiger Books, London. 1993 the VW Beetle was born in 1937, the brainchild of Ferdinand Porsche to be basic, tough, compact, adaptable, deliberately modest and distinctive. It had become a legend by the time production ceased in 1971, after reaching record level of mass production if 21 million units, when the dies were sold to Brazil in South America

To supersede the white cane would be like trying to destroy the dies of the Volkswagon Beetle[4]. Do your remember the sound of a VW Beetle - it putters like a cane! Its wind resistance was high and all round window visibility poor. Our recent model white canes would seem to parallel the introduction, in the mid 1960's, of the VW's 12v lighting, radial tyres and halogen headlamps.

Its sound, its utility, its wind response, its modesty and compactness, its wide availability; its adaptability and its affordability!

Once stated, the similarities are clear powerful, inoffensive and even humorous. On this basis it is easy to see how the VW beetle became a symbol to convey messages about the mobility offerred by the white cane.

But the story does not end there does it? There is the other half of the slogan we started with - there is this guide dog being described as a "Rolls Royce"!

While the white cane takes us out of the house into society there are those of us whose lives and aspirations demand more than the cane can provide. Many of us dream of quiet, controlled, fast and responsive mobility.

Does this mean that in searching for something different that I'm automatically dissatisfied with my cane or demeaning the skills learned from my O&M instructor? No. It simply means that I'm ready to consider exploring my world in a different way. It might even signify that the process of personal development initiated by my O&M instructor has achieved its goal. I would certainly not have been ready for guide dog mobility without the social adjustment that occurred as part of learning cane skills with my O&M instructor.

If we have the white cane being described as a VW what are we saying when we describe the guide dog as a Rolls Royce?

For me it stands for quiet, reliable, powerful, understated elegance that is fast and well genetically engineered[5]. But for others it might stand for the pretension of a person with more money than good sense. For others still, might the response be... 'Rolls Royce' - what's that?

At a person to person level, asking anyone about their dream of the perfect vehicle invites replies of infinite variety.

A mountain bicycle, the motor cycle (perhaps with sidecar), a vintage car of fond memory, a private train, a high performance car, a converted hearse, an off road 4WD, a helicopter or a prime mover. Each can reflect the ideal of different people or one person's ideal at different times of their lives. Personal social priorities colour the choice and cultural preferences can influence the selection of the particular model that gives form to the dream. If I were French, German, North American, Spanish or Japanese would I choose the Rolls Royce as my dreamcar[6]?

The danger of any rote response or slogan is that the images triggered in the mind of the speaker and listener can be different. When we use analogies we draw on unstated assumptions that can have strong emotional foundations. To overcome this sort of communication problems, if we use the 'Rolls Royce' analogy at all, we must be prepared to

4. Volkswagon want to introduce a new concept VW Beetle to recapture the market share that it lost with ceasing production

5 The *Motor Bulletin* of October 1993 describes the Rolls Royce as finely crafted, powerful, smooth refined, opulent and luxurious permitting individuality in stying by custom interior design; Jerome Bureau *'Images of 1001 Cars'* Tiger Books, London, 1993 at 24 describes it as classic, modest in style, comfortable, powerful, silent and long living - symbolised by the Spirit of Ecstasy it is synonymous with capitalism.

6 French elegance - Renault, Peugeot, Citroen; German precision - Mercedes, BMW, Porsche, Audi; Japanese ingenuity - Honda, Mazda, Nissan; Italian style - Ferrari, Maserati, Alfa Romeo; American opulence - Dusenberg, Cadillac, Chrysler, Buick

identify the features of the 'Rolls Royce' that we see as similar to guide dog mobility. In a professional context, building analogies from the word pictures generated from the expectations of clients can help to avoid the risk of misunderstanding. When talking about guide dog mobility with a client, might it be better to shape the discussion around individual ideas and expectation? All you would have to do is ask the client to describe their mobility dreamcar[7]?

But what about talking to the wider community about guide dog mobility?

It does not matter how well trained we are or how much potential our mobility aids might hold, we depend on community acceptance to make those inroads into society that are essential to our lives.

The descriptive analogy is one of the most powerful communication tools available to us to build bridges of respect between the sighted and the vision disabled worlds.

We cannot expect the ordinary person to understand what effective mobility means to us. We can expect those who respect us to appreciate and accept our view of the world and our needs within it are as valid as their own[8].

For any process aimed at explaining our needs to the community at large to be effective, the analogies we use must be realistic and realisable - that is capable of being fulfilled[9].

As community educators and fund raisers, we readily accept that we must provide the community with a base of reliable and honest information[10]. This is an essential element of strategies that develop respect. But information alone is not enough. Emotional engagement is needed so that peoples fears about people with disabilities do not obscure the message. One of the ways we can achieve this is to develop word pictures that isolate a dream or experience that initiates an emotional response that is common to both worlds[11].

A shared response can help to place a person within the world as it is experienced by another. This process of identification is essential to building respect for the needs of others[12] and an acceptance that their preferences should be valued equally with one's own[13].

This means that we must appreciate the way ordinary people respond to people with disabilities and then, with ethical sensitivity, select images from everyday experience so that ordinary people can identify emotionally and intellectually with the message we are trying to convey.

We must therefore ask ourselves
- what are the emotional barriers to the acceptance of messages about people with disabilities
- how does the Rolls Royce fit into the everyday experience of ordinary people

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7 A literal thinker who has little time for word pictures once told me that a Rolls Royce was a stupid way to describe guide dog mobility because a car wouldn't be any use in a revolving door

8 Veatch R M *Foundations of Justice: Why the retarded & the rest of us have claims to equality* OUP, New York 1986, 11; For example see Gething L & O'Loughlin K, *Person to Person - Community Awareness of Disability,* Williams & Wilkins- Aldis Pty Ltd: Sydney 1986

9 Downie R S 'Ambivalence of Attitude to the Mentally Retarded ' in Laura, Ashman (eds) *Moral Issues in Mental Retardation,* Croom Helm, London, 1985 p 29 at 40; this also means that fictional analogies such as might be drawn using Star Trek's '*Starship Enterprise*' or Dr Who's '*Tardis*' are unlikely to be useful.

10 Veatch R M *Foundations of Justice: Why the retarded & the rest of us have claims to equality* OUP, New York 1986. 11, For example see Gething L & O'Loughlin K, *Person to Person - Community Awareness of Disability,* Williams & Wilkins- Aldis Pty Ltd: Sydney 1986

11 Downie R S 'Ambivalence of Attitude to the Mentally Retarded ' in Laura, Ashman (eds) *Moral Issues in Mental Retardation,* Croom Helm, London, 1985 p 29 at 40

12 Veatch R M *Foundations of Justice: Why the retarded & the rest of us have claims to equality* OUP, New York 1986. 11

13 Also known as taking a moral point of view see Veatch R M *Foundations of Justice: Why the retarded & the rest of us have claims to equality* OUP, New York 1986. 10-11

The normal apprehensions of ordinary people who encounter anyone with a disability form barriers to our social acceptance. I'm talking about those honestly held fears that accompany the possibility of having to deal personally with the onset of serious permanent disability. Two social scientists Michelle Fine and Adrienne Asche describe it this way[14] -

> ... the thought or awareness of disability evokes feelings of vulnerability and death...the non-disabled person almost wants the one with the disability to suffer so as to confirm that the "normal" state is as good and as important as the "normal" thinks it is. Because disability can be equated to vulnerability to the uncontrollable, observing someone with a disability forces all of us to wonder about the consequences of what we cannot control....

The emotional force of these feelings can bring those of us who have been taught in Christianity, Judaism Islam or a sense of secular humanity, to be charitable toward those less fortunate - into conflict with what we have been taught. This tension between the way we feel and the way we have been taught to behave can aggravate these anxieties.

When we fail to fit the traditional picture associated with the helplessness and dependence of people with disabilities we challenge the view of the world that is held by many ordinary people. The offer of pity and sympathy or support for acts of compassion play an important part in dealing with the feelings these emotions leave unresolved. But whatever their value, they do not confer the respect that is due and necessary[15].

For many of them it is easier to deny that we are real by casting us as super people or frauds than to revise their view of the way we are[16]

These emotional forces are both subtle and powerful. They influence the way we see ourselves[17] as well as the attitudes and behaviour of ordinary people. This state of contention can paralyse the development of respect between people with disabilities and the wider community.

It is in this environment of unstated emotional reservation that we ask if the 'Rolls Royce' is an appropriate carrier for explaining guide dog mobility.

I contend that the 'Rolls Royce' is so far outside the everyday experience of ordinary people that their response is more likely to be 'how can they be entitled to a standard of mobility that is beyond what we can expect'.

If I am correct two things follow -

* to promote acceptance that leads to people with disabilities obtaining a standard of mobility that ordinary people cannot enjoy entrenches pity and does not build respect.
* to build respect using effective communication will require the development of new analogies that reflect attainable and relevant images.

In rethinking the 'Rolls Royce' analogy I pay tribute to its past use. So that we do not reconstruct something even less

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14 Fine & Asche 'Disability Beyond Stigma: Social Interaction, Discrimination and Activism' (1988) 44(1) *Journal of Social Issues* 15-16 referring to Jones E, Farina A, Hastorf A, Markus H, Miller D, R, French R *Social Stigma: The psychology of marked relationships* Freeman, New York 1984; See also Downie R S 'Ambivalence of Attitude to the Mentally Retarded ' in Laura, Ashman (eds) *Moral Issues in Mental Retardation,* Croom Helm, London, 1985 ;p 29 at 42, Morris J, *Pride Against Prejudice: Transforming attitudes to disability,* Women's Press, London, 1991;p 15-17, 84-93; 108-116

15 Veatch R M *Foundations of Justice: Why the retarded & the rest of us have claims to equality* OUP, New York 1986, 11

16 Downie R S 'Ambivalence of Attitude to the Mentally Retarded ' in Laura, Ashman (eds) *Moral Issues in Mental Retardation,* Croom Helm, London, 1985 p 29 at 40; Morris J, *Pride Against Prejudice: Transforming attitudes to disability,* Women's Press, London, 1991;p 15-17, 84-93; 108-116

17 Morris J, *Pride Against Prejudice: Transforming attitudes to disability,* Women's Press, London, 1991;p 15-17, 84-93; 108-116; Fine & Asche 'Disability Beyond Stigma: Social Interaction, Discrimination and Activism' (1988) 44(1) *Journal of Social Issues* 25...It is notonly our physical limitations that restrict us to or homes and those whom we know. It is the knowledge that each entry into the public world will be dominated by stares, by condescension, by pity and by hostility.'

serviceable its worth quickly reviewing the hidden messages carries by the VW/ Rolls Royce slogan.

We have established that ...

* information alone is insufficient to deal with deep seated stereotypes, prejudices and beliefs that derive their strength from their emotional foundations and long use
* in playing with words that engage the emotions as well as the intellect we carry an ethical responsibility to build respect rather than simply entrenching pity.

In saying ...

> ***If the white cane is like the VW of mobility for the vision disabled, the guide dog must be the Rolls Royce.***

I want to ask

* where are the people in this word picture
* what do we do with the implied difference in status between the two primary aids
* how do we deal with the effect a status game might have on our ideas about social acceptance
* why have we lost sight of the other mobility options

* ***Where are the people?***

Mobility training and guide dog services are generally provided through charitable organisations that are primarily supported by public donation. The economic viability of these organisations relies on a sympatheic regulatory environment and public support. If we accept that supporters and potential donors may be anxious or reserved in the presence of people with disabilities there are two ways to promote mobility and guide dog training.

They are...

* to focus on images that avoid the discomfort associated with dealing with people with disabilities, or
* to focus on working images that can reshape social attitudes and develop a climate of acceptance for people with disabilities

The first option entrenches pity and the second builds respect.

The first approach often uses a car or some other object of envy and the cute puppy to emotionally engage supporters and donors. These images are great fund raisers. If we also include small children in the picture we can expect a heart rending return.

Even the image of the all powerful working guide dog can be attractive (especially if you want to avoid trying to sell something as apparently insubstantial as a white cane).

But working images that focus on the handler or driver as the source of authority and direction in the relationship are seldom seen. Why?

We are not necessarily cute, let alone pitiable, and few of us meet centrefold specifications - even with a flashing white cane. The belief that we are weak and pitiable is left intact. After all without the dog (or the cane) we cannot manage at all.

The second approach is hard work that need not be less rewarding. A more honest analogy might help to break the stereotype allowing a basis for respect to form and still permit imagery that attracts community support. Might an example be:

> ***People who use white canes drive with the skill needed to steer the legendary VW in a gale.***
> ***Guide dog users have to command the quiet power of a Rolls Royce.***

More words? Yet perhaps a clearer image. The word picture now carries a

connotation of respect[18]. What is important is that the person is now an authority figure rather than being cast as being helpless or irrelevant.

I'm sure that with the injection of some creative energy (lawyers are not renowned for this) a better - and shorter - form of words could be found.

* *Social status*

You will have noticed that there is a difference in social status between the vehicle we use to describe the cane and the vehicle that describes the guide dog? Let's explore some of the effects that a connotation of relative status might produce.

The relegation of the white cane to lesser apparent status is offensive to many of us who find it a fully functional and effective mobility vehicle. This feeling of resentment can be aggravated if the guide dog is seen as an elitist symbol that sets guide dog handlers apart as an exclusive and preferred client group. Depending on the degree of social acceptance it is believed guide dog users enjoy this division can widen. People without a guide dog can feel that they are socially isolated and second class. So can their O&M instructors.

In cultures, such as Australia, that tend to label people as 'good' if they are readily accepted by children and animals, the guide dog user might seem to have an entry to society that is not shared by those with vision disabilities who use other mobility vehicles. This can produce an image of enviable fashionability, exclusivity and security that we might expect to become the principal motivation for many candidates who seek a guide dog to assist their mobility .

18 Stevenson C L *Ethics and Language*, Yale University Press, New Haven, 1944, 214-215...the interplay between the emotive and descriptive meanings of words determines linguistic change and its correlation with attitudes.

* *Social acceptance*

Whatever belief is held about the distinction of guide dog mobility, the reality of life with a guide dog can be very different.

Cultural diversity introduces many people to the community who come from places where the reception of animals is less than assured. The dog may be associated with aggression or disease and the handler may be labelled as 'bad' or socially deficient. The fact that word 'guide' rhymes with 'guard' can make explaining the role of the dog especially difficult for people who do not share a common first language. In a social context like this, laws alone cannot create a receptive community. Add to this the reservations we, as people with vision disabilities, have about our personal safety and we can see that social interaction can be confusing and stressful despite promises of efficient mobility using a guide dog.

Guide dog mobility does not bring the ease of travel and social acceptance that people with vision disabilities might associate with having a Rolls Royce at their disposal.

* ***Integrity as completeness***

Did you notice that the sighted guide has disappeared from the dream of finding an ideal means of primary mobility ? This incompleteness leaves those who must use a sighted guide because the other options are impractical or unnecessary <u>and</u> those people who assume the role of sighted guide without any status.

What does this omission tell strangers concerned for the mobility needs of people with vision disabilities?

That sighted guides and their companions are irrelevant nobodies?

Inclusion in a set of word pictures that explains the differences between mobility options while assigning to each equal status would seem to be one of the first steps in developing an ethical set of

communication strategies using descriptive analogy.

Time, interest and the drive for simplicity means that a single comprehensive picture is hard to draw. But if we develop a range of presentation analogies so that all options are covered in their turn and as many options are incorporated as practical into one off initiatives we could progressively and strategically cover the field.

May I summarise by saying that

* if we **recognise and feature the authority of our clients** rather than focussing solely on their mobility vehicles
* if we **identify** the particular features of the vehicles we choose to use to describe mobility aids **rather than relying on hidden meanings** to carry the emotional response
* if we **create a set of word pictures** that together or in sequence produce a comprehensive view of all or mobility options

Strange things might happen...

* the sighted guide could be represented by the quiet, unruffled elegance we associate with the Rolls Royce[19]or other culturally preferred vehicle[20],
* the white cane might be likened to the enduring popularity of the Porsche 911[21],
* an integrated mobility system that includes technological options might be likened to a Lamborghini Diablo[22]
* and the guide dog, the all weather vehicle that only causes problems when it springs a leak at the wrong time - perhaps a Harley Davidson softtail classic[23]?

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19 The *Motor Bulletin* of October 1993 describes the Rolls Royce as finely crafted, powerful, smooth refined, opulent and luxurious permitting individuality in stying by custom interior design; Jerome Bureau '*Images of 1001 Cars*' Tiger Books, London, 1993 at 24 describes it as classic, modest in style, comfortable, powerful, silent and long living - symbolised by the Spirit of Ecstasy it is synonymous with capitalism

20 Sweden has the Volvo and Saab, Russia has the Lada and Zil, India has the Mahindra, Italy has the Ferrari, Maserati, Alfa Romeo, the UK has the Bentley, Jaguar and Aston Martin, the USA the Cadillac or perhaps a Dusenberg?

21 Designed by the same man who developed the VW for Adolf Hitler yet targetting a high performance market that sought a responsive and sophisticated care Attemptys to supplant the Porsche 911 with later models have so far failed. It has maintained its enduring popularity despite its cost.

22 The *Motor Bulletin* of October 1993 describes the Lamborghini Diablo as the product of an impeccable pedigree that has made a dramatic, powerful, aggressive and beautiful car, in which the best thing is not the driving but the arriving. With limitless potential that can seldom be used (with poor rear visibility} it is big wide, heavy and tricky to handle To drive it requires plenty of commitment and the concentration and skill of a fighter pilot. But, for a grand entrance, its without peer. See also Jerome Bureau '*Images of 1001 Cars*' Tiger Books. London, 1993 at 52

23 The Harley-Davidson is a classic motor cycle renowned for its adaptability, responsiveness, speed and reliability A stylish machine, its availability is limited and those who desire one, desire them with a passion enduring a long wait for the supply of the model of their dreams

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HOW DO PERSONS WITH VISUAL IMPAIRMENTS EXPLORE NOVEL SPACES? A STUDY OF STRATEGIES USED BY EXCEPTIONALLY GOOD AND EXCEPTIONALLY POOR PERFORMERS

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The purpose of the study was to examine the search patterns and strategies that persons with visual impairments use to locate and learn the arrangement of objects in a novel space. The design of the study was first, to assess the spatial layout knowledge of 65 persons with early and late onset and total blindness after they explored a 15x15 foot novel space which was set up in gymnasiums at various test sites. Participants were videotaped while exploring the space for 7 minutes in order to locate the five target objects and learn their locations. They were then asked to describe the strategies they used to explore and learn about the space.

Second, in order to learn which strategies were effective at locating new objects and learning their locations relative to other objects, we selected the top and bottom 25% of the participants based upon their average errors at judging the directions of the objects relative to each other. We compared the strategies they verbally reported and the strategies they actually used as scored from the videotapes of their explorations. The best performing participants used search patterns that were effective in locating objects quickly as well as patterns and strategies that facilitated the development of object-to-object relationships.

REHABILITATION OF BLIND AND VISUALLY PERSONS WITH AN EMPHASIS ON LEISURE AND RECREATIONAL ACTIVITIES

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As the field of rehabilitation of blind persons has matures, we can identify a shift in emphasis. The meaning of successful rehabilitation for blind and visually impaired persons has changed from a one - dimensional to a multi - dimensional approach.

At the turn of the century the quality of rehabilitation was measured by vocational and employment status. More recently, social integration became a criterion for measuring this quality. Functional independence did not become a concern until after World War 2. In the years that followed, meaningful use of leisure time has come to be recognised as a valuable component of rehabilitation and a reliable means of assessing its success. The necessity for this change in emphasis can be found in the aging blind population, of which the majority is unemployed or retired.

Functional activities can be regained or acquired through training of and the instruction in skills. Rehabilitation may be centre-based, school-based, or community-based with itinerant personnel. Through the years, a variety of rehabilitation models for other disabilities have been adapted and developed for blind and visually impaired persons. Thus, the spectrum of rehabilitation programs for this population varies widely across educational, vocational, and functional factors.

MODEL DEVELOPMENTS

Each society has developed its own rehabilitation models according to its population structure, social beliefs and economic resources. As in other paramedical fields, there are state-sponsored rehabilitation programs as well as private programs for blind and visually impaired persons.

The development of models for rehabilitation of blind and visually impaired persons can be related on part to the demographic changes in this population and to the rapid, almost overwhelming, development of high technology. The technology of modern optical and electronic devices has a significant potential of increasing independent functioning for persons with special needs.

Functional rehabilitation programming for blind and visually impaired older adults has, for some time, offered orientation and mobility instruction, activities of daily living, and communication skills as routine. Sine the late 1970s, electronic devices have helped visually impaired people to maintain or regain independence through systematic instruction and professionally supervised practice.

LEISURE ACTIVITIES

Leisure time is characteristic of modern, industrialised societies. Often, as a person ages, less is expected from him or her in contributing to society, leaving the individual with more leisure time and increasing the risk of social alienation. This process should prompt rehabilitation workers to move away from the traditional approaches and to more imaginative, innovative programming that examine these new social arrangements with their new rehabilitation implications (Rusalem, 1971).

The significance of recreation for all persons is clear. The literature confirms the common sense approach that recreational activity leads to a feeling of well-being. Recreational activities hold an important place in group practice as a major tool on socialisation and re socialization models. Its importance has been reflected as early as the 1940s and the 1950s in the rehabilitation literature (Gentry 1984). It has become formally recognised as an area of specialisation in therapeutic fields.

Therapeutic recreation emerged from the descriptive terms of hospital recreation, medical recreation and corrective or adapted physical education (Krause 1978). Leisure-related programs for individual who have specific impairments are described as a tool for intellectual and social functioning.

Models based on informal recreation activities and social interaction for disabled and/or older people were found to be more reactivating than itinerant rehabilitation programs.

The need for recreation for all people, and for older persons in particular, cannot be disputed. Case (1963) emphasises it well in stating that, in our modern urbanised and specialised lives, the notion of individual recreation and wholeness implied by consummative experience is significant for the health of all persons, including those without vision. Thus it is essential for blind and visually impaired persons in a rehabilitation process to have a diversified leisure or recreational schedule.

Although the literature contains separate references to both functional rehabilitation and recreational rehabilitation for blind and visually impaired persons, (Eastman @ Blix, 1971), there appears to be no description of programs in which equal emphasis is put on functional skill instruction and recreational instruction.

For many blind and visually impaired persons. the traditional centre-based functional rehabilitation program cannot be taken into account because of prejudices and family attitudes. Isolated activities are often rejected for similar reason. The solution described in the literature suggests that, if the pursuit of leisure activities is to be carried out effectively, it must be fully interrogated with other aspects of the program. For example, basic social skills are required in much of the leisure time activity (Cook 1981). Events, like dining in the community, going to the theatre and taking part in sports, need problem-solving ability and basic functioning skills in the areas of personal management, mobility and communications.

AN INTEGRAL APPROACH TO RECREATION

A leisure program can be an effective basis for the development of functional, social, and education skills. Not only that, the seemingly different functions can, in much the same

way reinforce one another (Beck ford 1984).
A framework for rehabilitation integrated with recreation should be located in unconventional facilities like a resort hotel.

This approach may reduce the anxiety of blind people arising from misconceptions and stereotypical attitudes about "rehabilitation centres." Most adventitiously blind people had no familiarity with a rehabilitation program prior to the onset of their blindness, but familiar with resort settings. A functional rehabilitation program in such a setting may also allow the blind and visually impaired persons to leave home to which they have been confined since their vision loss. It also integrates the vision the normal society while the rehabilitation process.

Supervised vacation facilities with a group of people in a common situation may promote re-entry into the community. Supportive group intervention may further enhance adjustment. This program mode extends rehabilitation service to consumers who may find the traditional rehabilitation concept less appealing.

TWO MODELS REVIEWED

Two programs which will be described are structured and conducting on two different social and economic resources: The Program developed in Germany by IRIS is a private sponsored program and the program developed in Israel is a state sponsored model.

The program which will be described first initiated by the Institution for the Rehabilitation and Integration of the Sight- impaired (IRIS), Hamburg, Germany. The program is conducted in an ordinary environment, a hotel os a small village on the Moselle River. This allows interaction with other hotel guests and village residents (Garson 1983). The hotel staff was prepared for this program by participating in some blindfold and simulation activities. This type of preparation helps avoid over-protection of participants who should receive only as much help as they may need (Tilge, 1982). The program lasts for four weeks, with intensive rehabilitation instruction in orientation and mobility, daily living skills, devices. The instruction takes place on a one-to-one basis with a maximum of four hours a day per participant. The recreation program is offered to individuals and groups in the leisure time. These supervised recreation activities are designed around the hotel's facilities and include hiking,art and crafts, movement and dance discussion groups, bowling swimming, sauna, boat riding, visits to local wineries and wine testing, shopping in the near-by city, attending the village choir live concert, visiting local castles and old cities, local farms, fire station, art galleries and festivals, dinning out and walks along the river. The number of participants has ranged from 8 to 26. The age of these participants ranges from 18 to 80. The fees are covered to large degree by insurance and state agencies and a lesser degree by individual participants.

This program has been continually reviewed and revised since 1982. To date, it has a accommodated blind and visually impaired persons mostly from Germany, and some from Austria, Switzerland. Participant reports on the program emphasise an appreciation of the combined rehabilitation and recreation program (Tilge 1982: Gerson, 1983). The program which will be described was conducted jointly by teaching for visually impaired in Israel, as a special project for the first time in May, 1990. This program used the IRIS model with some modifications. It was housed in a comfortable cosy guest-house on the mountains near Jerusalem. The program lasted only two weeks and meant to be one

module in a wider rehabilitation program that each participating individual went through. It too offered one-to-one rehabilitation instructions in orientation and mobility daily living skills, communication skillsand hands-on experience with a large collection of electronic devices such as; optacon, Kurtwile reader, different sizes of CCTVs, large print computer writing processors, magnifiers and lightning devices, lots of home aid devices etc.
Each individual had up to four, one and a half hour sessions, individual or in small groups.

An emphasis was put on psychological aspects in group sessions led by experienced rehabilitation psychologist (five times during two weeks), movement exercise led by gymnastic instructor, information about general services for the blind and medical aspects. The recreation activities were lead with individuals and included group discussions and lectures, hiking, swimming, dancing, singing, horse riding, ping pong a concert a day trip to places of interest in Jerusalem. A visit to Israel Museum and the garden of sculptures, and a visit to Hebrew University's Botanic Gardens.
In the Israeli model too, the recreational activities were centred around the hotel's facilities and the participants had many occasions to mingle with the hotel's guest in the dinning room, bar swimming pool and hotel grounds.

The hotel staff was prepared before the program but blindfold experience was not necessary, as they accumulated in the past few years, a vast experience in serving groups of blind travellers and blind pilgrims who stayed in the hotel while their visit to Israel.

Eighteen persons participated in the first program. About half of the participants were totally blind, and half had some residual vision. The age of these participants ranged from 47 to 82. The fees for the hotel were paid partially by the participants and sponsored in part (one third) by the Centre for the Blind in Israel (the roof organisation of the blind). The instructional sessions were sponsored in the same method as they usually are in the state. One fourth by the local city where the participants resides and three fourths by the government's Rehabilitation Administration.
In a follow up survey conducted a short while ago most participants graded the program very highly. It seems that they have been staying in touch by calling each other on the phone , occasional meetings group. Encouraging other newly blind persons to enter rehabilitation programs, especially this mode. Some of them have continued meeting as a support group with psychologist, and those who required more functional rehabilitation have received it on an individual basis in their home. The satisfaction expressed by the participants from this type of rehabilitation model was welcomed by administrators and planners of services in Israel. It was decided to adapt this model as one of the country's rehabilitation model and offer it on a regular basis.

The satisfaction gained in these two similar programs centred on being able to make independent decisions about using skills and techniques, while at the same time enjoying the group leisure activities in the community after the program (Ryan, 1976).

These model for functional rehabilitation combined with leisure activities can be modified and implemented in other communities and countries. It may be necessary to emphasise different leisure activities and skill training because of cultural differences and availability of local resort facilities. These modifications should not, however effect the positive aspects of the programs as experiences in the German and Israeli models.

The Non-Exclusive Model of Mobility
and
The Mobility Therapist

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The focus of this presentation is what I believe to be the future direction of orientation and mobility instruction. The momentum for this change in direction is coming from many political and legislative changes in our country such as the American with Disabilities Act (ADA), consumer groups, and limited resources Another major influence is the majority of the visually impaired population has additional impairments. Therefore, as mobility specialists, it is imperative to develop a strategy or model that considers all factors that influence independent mobility and not limit our concerns to only the parameters of visual impairment.

Based on this background, I would like to propose a mobility approach or model for your consideration. During the research and evolution of this mobility model dating back to 1968, I felt it was imperative to consider the implications of concomitant or multiple conditions. In considering the mobility implications of other similar disabling conditions such as stroke, amputation, and mental retardation, it became apparent that the mobility implications were not specific to only visually impaired individuals but all handicapped individuals. Thus, a better understanding of the total process of orientation and mobility training has led to an awareness of the fact that many non-visually impaired people with other disabilities not only are subject to similar mobility limitations but can also benefit from formal mobility training. Thus, an appreciation for the many dimensions of travel problems has been the basis for a NON-EXCLUSIVE MODEL OF MOBILITY.

The title mobility therapist has been used as opposed to the orientation and mobility specialist. The major difference would be that the mobility therapist would be providing mobility training to "sighted handicapped individuals" in addition to visually impaired individuals. In essence, the role of the mobility therapist would be the same but the population served would be much broader then that of the orientation and mobility specialist. This NON-EXCLUSIVE APPROACH TO MOBILITY instruction places emphasis upon the functional mobility consequences stemming from disabling conditions and individual characteristics rather than upon the diagnostic category of an individual's disability. For example, as a mobility therapist, it is more important to consider balance limitation than the fact that the mobility consequence may be caused from multiple sclerosis, trauma, cerebral palsy, or an amputation. The mobility therapist need not develop instructional programs specific to each disability or multiple disability group, but must have an understanding of the components of independent mobility, be able to make individual assessments of limitations and abilities, and identify appropriate instructional methods for each student. Therefore, the following NON-EXCLUSIVE MODEL has been developed to illustrate the interaction of factors which influence independent mobility for visually impaired individuals, as well as other handicapped and multiply handicapped individuals.

We can think of mobility in terms of a formula; $M_I = I - (P_c + E_c)$ where M_I = INDEPENDENT MOBILITY, I = INTERVENTIONS, P_c = PERSONAL CONSTRAINTS and E_c = ENVIRONMENTAL CONSTRAINTS. Therefore, independent mobility is a function of the interaction of the of Personal Constraints (P_c), with the external, Environmental Constraints (E_c). The magnitude of this interaction(or the functional mobility problems) is reduced or eliminated by Interventions (training, devices and/or environmental modifications). Space does not permit elaboration of each of these factors. However, this model allows a framework for the mobility therapist to begin to analyze and formulate a curriculum for teaching other individuals with a disability.

With reference to the proposed mobility model, it is the consideration of the interaction of the specific individual in the specific environment which may or may not result in a functional mobility problem. This interaction is often disregarded and the only

consideration is the success or failure of the handicapped individual to achieve in the specific hospital or school environment.

Each of us has limits in terms of the type of environmental features we can negotiate. For example, in those periods of our lives when our physical and mental capabilities are less than ideal--early childhood, temporary periods of disability and old age--we experience handicaps of varying degrees in the environment. While most people pass through stages of ability and disability, some persons experience serious permanent limitations in ordinary environments which have been constructed with the ideal, able-bodied traveler in mind (Morgan, 1976).

There are two points of intervention for improving independent mobility. First, the functional abilities of the individual may be enhanced by providing individual mobility training (strategies to compensate for functional limitations) or by prescribing mobility devices. Second, environmental demands may be lessened by removing environmental/social barriers.

In the past fifty years, orientation and mobility specialists have learned a great deal and acquired a unique body of knowledge as it relates to independent mobility. I would like to highlight those unique INTERVENTION COMPONENTS that are generalizable to other individuals with functional mobility limitations.

The Intervention Component primarily involves environmental modifications or as described previously, training and/or providing a device. I will not address the environmental modifications but will concentrate on training. Our mobility training primarily focuses on three general areas: devices, skills and strategies. We are all familiar with the many mobility devices such as the Electronic Travel Aids (including the Laser Cane, Sonic Guide, Mowat Sensor, Sonic Pathfinder), long canes, adaptive mobility devices and dog guides. However there are many other mobility devices such as wheelchairs, crutches and support canes. These devices range from the very simple to the very sophisticated.

The second area involves the acquisition of skills. Basically a skill as such is proficiency or mastery in the performance of some task. The task may be public speaking, driving a car, card playing, playing a musical instrument, or using a mobility device. The skills

that are taught in mobility training are predominantly verbal and motor.

The area which mobility training is exemplary in the fields of rehabilitation and special education is the use of strategies. Strategies are generally thought of as an ingenious plan, method or effective way of getting a result. Many times individuals are forced to use their ingenuity to try some trick or alternative behavior to circumvent some obstacle. The best example of effective strategies I can think of are the long cane techniques and training. The cane by itself as a device is just a piece of pipe or fiberglass and will not make a person independently mobile. It is the strategies of using the cane in a systematic fashion that gives the significance to the long cane. Once the strategies have been taught, trough a systematic curriculum of instruction, the individual then develops skill and proficiency in the application of these strategies employing the use of the long cane as a device.

To further illustrate this point let me use a simple example of an individual with Cerebral Palsy. She uses a wheel chair and her functional mobility limitation in this example is the inability or personal constraint of being able to go over curbs or even up steep curb cuts. The environmental feature that causes a constraint are curbs and severe elevation changes. This individual when confronted or interacting with a curb has a functional mobility problem. The environmental intervention may be to provide appropriate curb cuts. The training intervention may be to teach the individual to use travel strategies such as taking a different route, going down a driveway, crossing the street and traveling along the curb until another driveway is reached. A strategy that I teach and is known to all mobility specialists in a different form, is to ask for assistance. Like the sighted guide technique, the wheelchair user must also be able to quickly give information on how the pedestrian should manipulate the wheelchair up or down the curb. As you all know form your experience with visually impaired individuals, this strategy of asking for assistance and instructing a pedestrian is a skill that needs to be practiced.

There are several key factors to the intervention component in mobility that have proven extremely effective. These factors include: individualized instruction; instruction in real

environments; teaching environmental problem solving strategies; and lessons of graduated difficulty and responsibility

Finally, one of the most important elements of the NON-EXCLUSIVE APPROACH TO MOBILITY is the designation of mobility instruction as the primary responsibility of one or more full-time staff members of an agency or program. Where mobility instruction of some sort is offered in programs for persons with limitations other than visual impairment such as mental retardation, it is usually done by someone whose main responsibility lies elsewhere and who provides travel instruction only when time permits or when the need is so obvious and pressing that other duties must be put aside. Giving specific staff members responsibility for mobility instruction is an important step in the recognition and development of this service as an essential part of the program. The presence of mobility therapists in a program also indicates that someone in the organization, as a professional responsibility, will focus attention on this area and on the literature to learn how to improve the service. A designated person is able to devote their full attention to this service without the distractions of other responsibilities

In summary, there has been a tendency to disregard the mobility problems of other handicapped groups based, perhaps, on the assumption that these individuals are able to teach themselves how to travel. Because many handicapped individuals go to hospitals and clinics and receive physical and/or occupational therapy and instruction in the use of various prosthetic devices, this assumption is reinforced. In addition. many handicapped individuals are independently mobile. We see them on the streets and in public places. This situation is not unlike that of a visually impaired person prior to formal mobility programs. Some had been able to teach themselves how to travel through the community and some still do.

Many visually impaired individuals, however, for a variety of reasons are unable to achieve this goal on their own. Formal or systematic mobility services have been developed to guarantee each individual the opportunity to learn how to travel to the fullest extent of his or her abilities. Without a formal educational system, some individuals (handicapped and nonhandicapped) would still learn about the world and how to interact with it. However, steps

must be taken to assure that each person will have this opportunity and that the acquisition of safe independent mobility is not left to chance. Similarly, it is important not to assume that every handicapped person will develop independent travel skill without structured intervention. It must be emphasized, however, that just because a person has a handicap or is old they will not necessarily need mobility training.

The opportunity for formalized orientation and mobility instruction must be provided for all handicapped, multiply handicapped and elderly persons who need such training. This NON-EXCLUSIVE APPROACH TO MOBILITY TRAINING is necessary if we are going to be consistent with policies to integrate all people into the mainstream of our society. Making policies, changing the environment, and developing new equipment is not enough. Appropriate learning experiences must be provided when needed.

As mobility specialists we have an obligation to offer mobility services to all visually impaired individuals not just the "easy students" or an elite few. Therefore, we have a professional responsibility to promote NON-EXCLUSIVE MOBILITY PROGRAMS and gain further knowledge about the mobility consequences of other disabling conditions and the interacting effect with visual impairment. Finally, knowing the significance and benefits from systematic mobility instruction provided by a trained mobility specialist can you in good conscience deny this service to other handicapped individuals?

LOW VISION ASSESSMENT AND TRAINING: THE USE OF COMPUTER GENERATED GRAPHICS

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It has been estimated that more than ninety per cent of people who are registered as visually impaired have a degree of useable, residual vision (Tavernier, 1993). The category which subsumes these people, viz. that of "low vision", comprises a most heterogeneous range of ocular and cerebral pathologies ranging from a straightforward loss of acuity over the whole of the visual field due to corneal and intra-ocular opacities, to heteronomous hemianopias and multiple scotomata arising from lesions in the optic tract.

The category "low vision" therefore serves only to flag up the need to assess an individual's residual function with a view to improving it via medical or surgical intervention, or to provide the person with some form of vision aid for the purposes of reading or activities of independent living, including mobility. As the beginning of a taxonomic system which might guide research, the term "low vision" does not take us any further, so that we cannot say that we have taken even the first step required in scientific endeavour.

It is also pertinent to point out that vision scientists tend not to work in the area of low vision which might benefit from their skills and knowledge, so that we do not have a body of knowledge which could inform practice. As I have said before, "Successful as they (vision training programmes) may be, such programmes have tended to proceed from a common sense point of view, which means that the visual and other factors

that underlie overt performance remain poorly understood. If a body of knowledge is to be developed, vision specialists must turn their attention toward making explicit the processes underlying successful use of low vision". (Dodds, 1989, p.439, quoted in Tavernier, 1993). In a similar vein, a distinguished vision scientist has said that, "We cannot specify with any precision the visual requirements for daily tasks such as driving or walking. Clusters or batteries of visual tests should be developed that do a better job of predicting human performance than currently available tests do". (Sekuler et al., 1983).

In a recent review article, Tavernier (1993) identified a number of approaches to the problem of low vision. Leaving aside developmental considerations and concentrating on adults only, he singled out two main approaches. The first was that of Collins et al. (1984) who utilised fading and feedback techniques to produce measurable improvements in acuity in individuals suffering from correctable myopia. Although there is some disagreement about the mechanisms whereby the improvement comes about (Matson et al, 1983; Pbert et al., 1988), results suggest that such an approach may be useful in other areas. The second study identified by Tavernier was the Nottingham one (Dodds & Davis, 1989). This work offered a theoretical framework within which low vision mobility could be understood, and it was based on Gibson's (1969) ecological view of visual perception, together with an understanding of how vision could be regarded both as a "top down" and as a "bottom up" process. For example, invariant movements of textural elements over the retina specify environmental events relative to a moving observer, and perceptual processes at this level appear to operate unconsciously.

On the other hand, because vision only samples small portions of the visual field foveally, visual memory serves to provide a context within which perception takes place, and working memory constantly fills in what is not sampled. The identification of two functional visual systems (Trevarthan, 1968) gives physiological underpinning to this distinction.

What is not known is whether or not the two visual systems can be equally trained to improve visual perception when one or the other is selectively impaired.

The OCULA programme (Dodds & Davis, 1989), an interactive, computer generated graphics package, was created with four aims in mind. The first was to enable vision scientists to assess the level of visual functioning of any client, independently of traditional clinical assessment. The second was to test the validity of the theoretical ideas outlined above. The third was to enable one to measure any improvement in performance as result of training, and the fourth was to evaluate any transfer of gains made during training to visually guided mobility in a real-world situation.

The results of the initial work were exciting, and can be summarised as follows. First, the system proved highly workable. Second, mere repetition of task performance without formal feedback resulted in improvements in visual efficiency which were maintained from day to day. Third, these improvements successfully transferred to independent mobility performance as measured over a carefully designed test route. Finally, the need to consider the role of emotional and motivational factors became apparent.

The author believes that the OCULA approach has only scratched the surface of assessing and training low vision, but that it could provide a blue-print for future research. Computer graphics have become highly sophisticated since the initial work was carried out using a BBC micro-computer, and it would appear that the whole field of vision science is ready technologically to take on board the ideas outlined in the initial study if the right team of people can be put together.

Wittgenstein (1958) once said that "...in psychology there are experimental methods and conceptual confusion...though problem and method pass each other by". I would argue that we now have both the right conceptual framework as well as an advanced technological capacity to work within it. Let us

make sure that Wittgenstein's accusation cannot be levelled against us in the last decade of the twentieth century.

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A BIG STEP TO PRE-SCHOOL - THE ORIENTATION AND MOBILITY INSTRUCTOR'S ROLE

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The Royal Victorian Institute for the Blind (R.V.I.B.) Education Centre in Melbourne receives referrals of children with vision impairment as young as one day old. The child's family and other professionals involved are then offered the support and services of a Home Adviser from the R.V.I.B. Education Centre.

Referrals are usually made to the Orientation and Mobility Instructor when a child starts to move independently and their family and Home Adviser recognise the need for more specific intervention. Much of the work a Home Adviser does is to advise on and monitor the child's general development including very early orientation and mobility skills. Home Advisers are often in a more advantageous position to provide these skills than the Orientation and Mobility Instructor. That is, they usually have a well established rapport with the child and their family, sometimes families live in geographically distant locations and the frequency of the Home Advisers' visits can provide consistency and reinforcement of skills.

In most cases the Orientation and Mobility Instructor becomes more formally involved when the child transfers from a home based program to one in their local playgroup, pre-school or other early childhood education setting. It is usual at this stage for children to transfer from the Home Advisory Service to the R.V.I.B. Pre-School Visiting Teacher Service. The Orientation and Mobility Instructor receives advance notice of a child's intended placement and then begins the process of equipping the child, their family and prospective staff with the necessary skills and information to support the transition from home to the early childhood education setting.

The first step in the transition process involves meeting the child and family in their home environment and assessing the child's present level of mobility. This assessment can provide a gauge for expectation upon the child attending their new educational setting. This includes skills such as ability -to trail, square off, use of protective techniques, understanding of basic concepts and laterality, spatial awareness, ability to interpret auditory, tactile and visual clues for orientation and so on.

Secondly, the Orientation and Mobility Instructor meets with staff at the proposed early childhood education setting and views the environment for suitability of the individual child. Environmental factors looked at include, position of useful landmarks and clues, general placement of furniture and equipment, both indoors and outdoors, the range of tactile ground and floor surface changes that can be utilized for orientation; the position of the child's work station/chair in relation to access, the possible need for colour contrasting steps, upright poles and any other potential hazards, reduction of glare where there are large north facing windows, and so on. It is at this stage that the Orientation and Mobility Instructor schedules dates for inservice training of staff.

The third step in the process involves providing staff with the necessary skills to understand the orientation and mobility needs of the child as well as provide them with direction and ongoing skill development. Inservice programs usually involve the following components; how best to guide a young child with vision impairment, how to orientate a child to a new environment, independent travel techniques such as trailing, squaring off, and self protection, how best to support the child when on excursions or in unfamiliar areas and how to encourage ongoing sensory skill development. This inservice training program is undertaken by staff either having their vision completely occluded or simulating the child's particular vision impairment. The child's parents and care-givers are invited to attend all meetings and inservice programs and in most cases are actively involved in both practical and discussion components.

Orientating the child to their new education setting usually follows staff inservice and in most cases is conducted by the Orientation and Mobility Instructor just prior to commencement of the school year. Initially, it is best to arrange a time when the pre-school is free of other children and the child can receive direction and explore without interruption.

When orientating very young children to new environments, general orientation principles remain, that is, establishing a main reference point and guiding them around the perimeter of the area first. One must ensure the child is not overwhelmed with information and objectives are set in order of priority. Generally indoor orientation is addressed first although in some cases it may be necessary to teach the route from the pre-school gates to the pre-school entrance door. From this point the position of the child's "peg" is important and needs to be situated close to a prominent landmark or reference point that is within easy access to the entrance door.

Once the child is familiar with the room's perimeter, the instructor can then establish specific objectives within the room. Most pre-schools have several permanently set up areas that can be utilized as references. These include a wet or messy play area; a "mat" area for singing and storytime; an office for staff preparation; a small kitchen; a bathroom; and of course permanent features such as windows and doors. Other areas which are often changeable include a block play area; a "home corner"; fish tanks; birds in cages; a reading corner; and so on. In most cases objectives can be set in terms of access and the child's particular interest. Features such as different floor surfaces, traffic noise, light sources through windows and doors can be used to reinforce orientation, and of course other references can be introduced where necessary. For example, contrasting tactile guidelines can be taped to the floor where there is a large expanse of carpet to traverse.

Outdoor orientation can be assisted by a variety of distinctive environmental changes including concrete paths, bark chip areas, sand pits, undulating grass areas, treated pine logs surrounding play equipment, fencing, traffic or pedestrian noise, the different sounds produced by particular play equipment and so on.

It is important to be selective with objectives and ensure the child has established a route independently before introducing any new challenge.

Once the child has gained a degree of independent mobility, any ongoing orientation or reinforcement of established routes can be conducted by either the child's Visiting Teacher, who is specialized in vision impairment, or the pre-school staff who have received inservice training. In some cases, the Orientation and Mobility Instructor's role can change to a more consultative one, providing regular visits to monitor progress and assist with individual program planning.

It is my experience that young children with vision impairment must feel confident within their educational environment by establishing some degree of independent movement. This belief is supported by other professionals who make similar observations and agree that maximum input and truly focused learning is most effective when a child is confident and familiar with their surroundings. The pre-school years are extremely important for children with vision impairment and must ensure readiness for the next big step in the child's education - transition to primary school.

BALANCE, WALKING PATTERNS, AND STRAIGHT LINE TRAVEL OF CONGENITALLY BLIND CHILDREN

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One of the most important skills involved in safe travel for people with visual impairments is the ability to cross streets and open areas without veering. This, and the development of mature spatial gait (walking) patterns (e.g. less out-toeing, larger steps), are frequently difficult skills for congenitally blind children to develop. Of interest is the possibility that the performance of both of these skills may rest in part upon a foundation of good dynamic balance.

Mature spatial gait patterns depend at least in part on the development of good balance (Gipson, 1981) and congenitally blind children often have limited balance abilities (Pereira, 1990). In fact, many of the characteristics of immature gait shown by congenitally blind children (Rosen, 1986) can be seen to have their origin in poorly developed balance reactions. For example, an increased foot angle (out-toeing) and increased stride width (distance between the feet in a plane perpendicular to the line of travel) serve to increase the base of support; a lack of arm swing lowers the overall center of gravity. With regard to veering, little is known about the relationship of balance to it.

This pilot study investigated the relationship between a subject's dynamic balance, spatial gait patterns and average amount of veer when walking a 20-foot distance.

<u>Methods</u>
Thirty-four congenitally blind children aged 6 - 18 years participated in the study. Each had vision of light perception or less from birth, and none had additional disabilities.

Assessment of Gait.

Spatial gait patterns were assessed by having each subject walk along a 20 foot (6.1 meter) paper runner toward a sound source. Each subject wore tennis shoes. Small ink pads, each with a different color of ink, were placed on the center point of the heel and toe of each shoe. When the subject walked on the paper, ink prints were left on the paper, marking the exact placement of the heel and toe at each step. From this information, data were then collected on the following gait parameters: stride width, step length, and foot angle. Observational data were also collected on the speed of walking, cadence (steps/second), and presence or absence of a reciprocal arm swing.

Assessment of Dynamic Balance.

Coordinated balance reactions are reflected in those body motions which work to maintain the upright position of the body in response to changes in the supporting surface or in response to an external force upon the body. Coordinated balance reactions have been described in previous studies of balance in non-handicapped populations (Zador, 1938).

Balance reactions were assessed as the subject stood on a 4' x 4' rocker board. As the board was slowly tipped to 30 degrees in each direction - sideways, forward, backward - the subject's postural adjustments were recorded as he or she attempted to maintain an upright position. Each subject was given points according to the effectiveness of his or her balance reactions in response to tipping in each direction (0=subject loses balance; 1= reactions interfere with balance but subject remains upright; 2=no reactions; 3=effective reactions). Adjustments were considered to be effective if they facilitated the maintenance of an upright posture without increasing the base of support or lowering the center of gravity. Each subject was given two trials in each direction. The maximum number of points that could be earned per set of trials was 30.

Assessment of Veering.

A 40-foot long strip of paper was placed at a distance of 20 feet from the subject's starting position, perpendicular to the subject's projected line of travel. The paper was marked in 2.5 cm. intervals to the left and right of a center point located directly ahead of the subject. This center point was assigned a value of 0

(no veer). The subject was initially positioned with his/her feet at 15 degrees of out-toeing before walking to eliminate the effect on veer of unequal out-toeing in the starting position.

The subject was asked to walk straight ahead until crossing over the paper. The position at which the first heel touched the paper was recorded both in terms of centimeters away from the center (zero) point and the direction of veer. Two trials were given. To be certain that the subject knew the location of the zero point, a verbal sound cue was given from that location immediately before he or she started walking.

<u>Results</u>
All of the subjects in this study demonstated one or more characteristics of immature gait typically seen in congenitally blind children (Rosen, 1986): lack of reciprocal arm swing, step lengths less than 1.5 times the foot length, a step width of more than 10.2 cms., and a foot angle greater than 15 degrees. All of the 34 subjects demonstrated a lack of reciprocal arm swing. Six of the 34 subjects also demonstrated short step lengths, 13 had a foot angle greater than 15 degrees, and 16 had a stride width greater than 10.2 cms. The average cadence was 1.8 steps/ second.

The subjects demonstrated a wide range of veering from 5.4 cms. to 203.2 cms. (average veer 50.3 cms.). There was no significant difference in the number of veers to the left or right. In addition, each demonstrated a lack of effective balance reactions with scores ranging from 0-20 points.

In analyzing the data, strong negative correlations were found between balance and veering. Strong negative correlations were also found between balance and stride width; moderate negative correlations were found between balance and foot angle. Only very weak negative correlations were found between balance and cadence and the number of immature gait characteristics demosntrated. All correlations were significant at the $p \leq .05$ level.

<u>Discussion</u>
The strong negative correlation between dynamic balance and veering suggests that subjects who perform better on the assessment of balance tend to veer less. This raises the question

as to whether or not dynamic balance is not just a related factor to a person's ability to walk without veering, but is perhaps a contributing factor. Future research is recommended in this area to determine the presence or absence of such a causal relationship.

The negative correlations between dynamic balance and mature gait patterns suggest that those with better balance demonstrate more mature gait patterns. This is not surprising given the role of immature gait patterns in increasing the base of support and lowering the center of gravity, two fundamental aspects of compensating for impaired balance.

A better understanding the role of dynamic balance in both straight line travel and in the development of mature gait patterns is needed. Such an understanding could provide the basis for developing new and effective strategies for improving straight line travel ability and developing mature gait patterns in congenitally blind children through the development of improved dynamic balance skills.

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DEVELOPING INDEPENDENT MOVEMENT IN PRESCHOOL AND MULTIHANDICAPPED CHILDREN WITH PUSHABLE MOBILITY DEVICES

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The primary symbol of independent travel for the blind has been the long cane, the nationally recognized white cane with a red tip. Unfortunately, many preschool and/or multihandicapped students do not possess the necessary physical and cognitive skills to use the long cane effectively. In general, the major problem in teaching mobility to young blind children is encouraging them to move. Blind children are often delayed in crawling, walking and reaching. In addition, the cognitive skill of cause and effect, anticipatory behavior, fine motor skills such as grasping, and language skills are all required to benefit from the use of long cane.

Think of the 3-5 year old blind child who is delayed in the prerequisite movement experiences of sighted peers. This child may have difficulty holding the cane in front and moving the cane in a sweeping fashion to clear the walking path. These problems have caused mobility instructors to seek alternatives to the long cane which will enable these young children to travel independently early in life and hopefully limit or eliminate the developmental delays caused by blindness.

During the past few years, Pushable Mobility Devices (PMD) have been recognized by mobility instructors as a valuable adaptation to the traditional long cane. The PMD is made of commercially produced PVC pipe, elbow joints and glue. The PMD is individually designed and measured to match the size, stride length, and skill level of each student. Experiences at The Texas School for the Blind and the Connecticut Department of Education suggest the PMD assists preschool and/or multihandicapped students in moving freely to explore the environment, maneuvering around obstacles, locating steps, and walking at an appropriate speed. With this information, the O&M department at The Maryland School for the Blind initiated an informal program of teaching preschool blind children with the PMD to determine if this new device would be appropriate for these students.

We began this project by identifying children who might benefit from the PMD. There were 11 males and 4 females. They ranged in age from 5 to 20 with a mean age of 13 (SD = 10). We have found the PMD to be an excellent tool for improving the mobility skills of preschool visually impaired students. From the descriptions by teachers, parents, and mobility instructors, (Table 1) the PMD accomplishes the following:

1) <u>Improves posture and gait</u>
   This occurs by reducing extraneous body movements and centering children at the midline of their body.

2) Increases walking speed
Children appear to be less fearful of their environment and are more willing to move more quickly.

3) Improves stride length
Stride length, walking speed, and posture are inter-related with each other. Prior to using the PMD, children were shuffling their feet, as a protective mechanism. When using the PMD, the stride length has increased as confidence was gained.

4) Increases ability to detect and avoid obstacles
One of the biggest fears for young blind travelers is bumping into obstacles and being injured. The PMD, because of its design, dramatically increases the student's ability to detect and avoid contacting obstacles.

5) Requires limited arm strength
This advantage allows the PMD to be introduced at a much earlier age than the traditional long cane. The only requirement is the ability to grasp with both hands simultaneously.

6) Prepares child for the long cane
For many children, the long cane will be the cane of choice in future years. With the PMD, the children are taught the proper grip, storage, and social skills for using a cane.

7) Is inexpensive to produce and modify
Unlike other types of adaptive equipment, which can cost from several hundred to several thousands of dollars, one PMD can be produced for under $10.00. In addition, a PMD is easy to disassemble for the purpose of making adaptations, such as increasing or decreasing the length, width, or shape.

8) Requires little instruction and its use can be supervised by staff
The actual techniques involved in using the PMD do not require extensive instruction. Once the student and teacher understand the proper grip and arm position, extensive practice can be supervised by the classroom teacher. Additional instruction for more advanced techniques,

a variety of indoor and outdoor environments, and the development of orientation skills are developed as the child matures.

9) Increases safety, protection and student confidence
Combining all of the advantages of the PMD has proven to offer the young traveler who is blind the opportunity to be safe, to have the needed protection to travel independently and, as a result, to demonstrate increased confidence.

10) Provides an understanding of the environment
The PMD enables students to understand the location of obstacles and stairs; ultimately, this understanding builds the foundation for good orientation skills.

11) Assists with attending to the task and focusing the child's energy
Placing both hands on the PMD requires the child to attend to walking. Jumping, bouncing, and poor body posture are greatly reduced.

Disadvantages

The PMD has one major disadvantage - its large, bulky size. For example, getting in and out of a car with the PMD can be difficult. Walking in line with a group of fellow students often creates a tripping hazard. Walking with a sighted guide is also a problem as the child must hold the arm of the sighted person while controlling the PMD with one hand. This same problem also occurs when ascending or descending stairs. One hand is required to hold the railing, leaving one hand to control the PMD. The size has also been a problem for cosmetic reasons. Some parents have expressed concern that the PMD can be unsightly and confusing to the general public who do not realize the PMD is, in fact, an identification of blindness.

Table 1

Advantages and Disadvantages of PMD

Advantages	Disadvantages
Increases safety and protection because of size	Causes problem in restricted areas (cars)
Improves stride length	Make travel up and down stairs awkward
Increases walking speed	Sticks in grass
Improves posture	Misses curb to the side
Improves obstacle detection	Creates difficulty in walking sighted guide
Improves obstacle avoidance	Causes tripping hazard for other students
Requires limited arm strength	Cannot be used with one hand
Encourages natural movement	Cosmetically unattractive
Prepares child for the long cane	
Improves straight line walking	
Teaches transferable skills	
Is inexpensive to produce	
Is easy to make and modify	
Increases student confidence	
Requires little instruction	
Can be supervised by many staff	
Increases environmental awareness	

In conclusion, the experiences of staff, parents, and students clearly demonstrate the effectiveness of this device to improve posture, gait, walking speed, and orientation, to name a few. In future years we expect that these

children, and others with whom the device will be tried, will demonstrate a continuation of the progress they made this year with the PMD and will be able to reduce or eliminate many of the problems which children who are blind usually experience in the area of orientation and mobility.

THE IMPORTANCE OF PRESCHOOL LOW VISION O & M

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Orientation and Mobility, as a field, originated from the Veterans' Hospitals as a way to rehabilitate blinded war veterans. As a university training program it is less than 30 years old. During that time the philosophy of who orientation and mobility services are appropriate for has also expanded. It began with blind adults and grew to include older blind children. It has only been recently that the philosophy of teaching very young blind children has been widely accepted.

For the person with low vision, changes in philosophy have been slower to come. In the past, people with low vision were sent to "sight saving" schools. It was once believed a person had only a limited amount of vision and when it was gone it was gone. The sight saving schools did not teach how to use residual vision. Low vision students were blindfolded and taught as blind students in an effort to make the vision they had last as long as possible. Unfortunately, these low vision students did not learn to interpret what they saw and, as a result, did not know how to use the vision the school was trying so hard to save.

Times have changed and attitudes have changed with them. Teachers use various magnification devices and large print materials as tools for improving academic skills. Low vision specialists prescribe monoculars and other low vision aids. And, while Orientation and Mobility Specialists are trying to keep up with changing philosophies they are still behind in the area of low vision mobility.

For most low vision travelers, learning to be independent meant putting on a blindfold and learning to use a cane. For many people with low vision this experience was demeaning and frightening. Orientation and Mobility Specialists are trying to respond to these concerns by teaching without a blindfold and incorporating the use of low vision aids. In recent years, techniques have been developed to teach mobility skills using environmental cues and residual vision without the use of aids. Most of the advances in low vision mobility have been directed toward adults. The philosophies in the schools have been slower to change.

Most Mobility Specialists working in the schools have often heard "She does not need any mobility. She gets around the classroom just fine." The parents may not know what mobility services can teach and the child may be afraid of getting a cane and being labeled "blind". Meanwhile, the child may be stumbling or insecure in new places. Perhaps she does not go out and play in her neighborhood. Children that do not get services can become resentful as adults and never take advantage of the services available to them; especially it it includes blindfold travel.

The solution is to start training early. Many young low vision children are fearful of the world around them. The environment is constantly changing. Shadows move, clouds create different lighting, depth changes appear and disappear,and every building is different. The child may be fine in her own home but will not explore a relative's home. Perhaps she is fine on a sunny day but will not go out and play after it rains because she cannot differentiate a puddle from a hole in the ground. Falling off the sidewalk because of an inability to judge depth is enough to keep a child from venturing out. For the child who receives early intervention--preschool or sooner--these problems can be avoided.

The child who receives preschool orientation and mobility services will learn to interpret what is seen. She will learn early to be comfortable wearing sunglasses and a hat to reduce glare. She will understand the visual changes that occur with changes in the weather. She will be able to identify environmental clues which indicate drop offs or other changes in depth.

A benefit of early intervention is improved self esteem and social skills. When a child knows when to trust her vision she is more confident. Playing outside with friends becomes a joy, not a chore. Because the child is comfortable with her vision she becomes more comfortable with soliciting aid. She learns that how she sees is not necessarily how other people see.

Preschool Orientation and mobility is a time for experimenting with low vision aids and a long cane in a playful manner. The child sees how all travel devices and aids can be used in conjunction with vision. The positive image will stay with the child so that, if at some point in the future, the child needs these devices she will be more receptive.

A pattern of orientation and mobility services established early is easier to follow through the school system. Because the child comes into the school with mobility training continued service is accepted as normal. When the child graduates from high school she will be a capable, independent, traveler with high self esteem. She will be comfortable with her vision and better able to express her future orientaion and mobility needs to other Orientation and Mobility Specialists. For this to happen though, the low vision traveler must have positive experiences early on in her mobility training. As Orientation and Mobility Specialists it is our responsiblity to see that happens.

"COME ON, ... LET'S GO!"

A caregiver's guide to Orientation and Mobility for pre-schoolers with a vision impairment

Project Co-ordinator: Nancy Higgins, B.A., M.Ed., OMIAA, AER

In 1993 the Royal New Zealand Foundation for the Blind funded a distance educational project which would 'help' parents or caregivers 'help' their children with a vision impairment develop Orientation and Mobility concepts and skills.

The project involved producing a 22 minute video, and booklet, both entitled "Come On, ... Let's Go!".

The video was scripted and produced in the same style as the booklet which had been written previously in 1992. The booklet was essentially a rewrite of the Blind Children's Centre, (Los Angeles, USA) booklet "Reaching, Crawling, Walking .... Let's Get Moving", by Susan Simmons Ph.d., and Sharon O'Mara Maida, M.Ed. The rewritten version was written so that caregivers in New Zealand who read the booklet could see themselves in the New Zealand environment.

As society, however, receives much of its information these days from television, the production of a video was also thought to be a viable means to reinforce the information in the booklet. Distance educational videos help ease the feeling of isolation that a parent of children with visual impairments may have as they are frequently working with their children without the day-to-day support of other parents in similar circumstances. It is not uncommon for a parent to never have seen or have contact with people with a vision impairment before their baby was born.

"Come On, ...Let's Go!" shows preschoolers at four orientation and mobility developmental stages; reaching, crawling, walking and cane use. In the video, each stage is clearly separated from each other in 5-7 minute video segments which are divided by title graphics, music, voice over, and segment summary graphics. Each segment shows three to four children and their caregivers working on activities and discussing issues in that particular orientation and mobility stage. This allows the caregiver to view only the segment which is appropriate to their child and helps the caregiver 'see into the future' as it depicts how orientation and mobility will be an integral part of the child's life as he/she comes older and moves from one stage to another.

Orientation and Mobility Instructors are rarely shown in the video, as the targeted audience, caregivers more readily identify with other caregivers and not 'experts'. Caregivers can then hopefully become more confident to work with their children on orientation and mobility skills and concepts themselves.

This distance educational package is upbeat, positive and practical. It can be used to introduce caregivers to Orientation and Mobility, and can also be used by the Orientation and Mobility Instructor to emphasise activities and games which may be useful for the individual child with a vision impairment.

The video and booklet can be ordered from the Public Relations Department, Royal NZ Foundation for the Blind, Private Bag 99941, Newmarket, Auckland 1, New Zealand at a cost of $NZ40.

LEARNED HELPLESSNESS IN CHILDREN WITH VISUAL IMPAIRMENTS

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While personal, social, and academic problems are not an inevitable result of visual impairment, the earliest learning of the visually impaired often begins a cycle of restricted mobility and limited experiences resulting in passivity, dependence and poor self-concept.

Difficulty and repeated experiences of failure are inescapable for students with visual impairments, and repeated failure experience has been hypothesized to result in the cluster of maladaptive behaviors labeled "learned helplessness." For students, referred to as "learned helpless," failure appears to be devastating and results in a severe disruption of performance, decreased effort, and lowered persistence. These students use poorer problem-solving strategies, expect to fail, and attribute their failures to a personal lack of ability.

Purpose

The purpose of this study was to: a) develop assessment instruments and procedures to measure the learned helplessness syndrome among students with visual impairment; and b) describe and compare expectations for success and failure, persistence time in the face of difficulty or failure, and attributional beliefs about the causes of success or failure among students with visual impairments at a State School for the Blind or in a mainstreamed

general/regular education classroom in a public school local education agency (LEA).

Methodology

The study consisted of three phrases. In Phase One seven students with visual impairments from the state school and six students with visual impairments placed in a general education classroom were selected from grades 3-6. In Phase Two the learned helpless assessment instruments and procedures were developed. In Phase Three the "academic-like" and non-academic assessment procedures were administered to study the characteristics of the learned helplessness syndrome among students with visual impairments.

Before the specific learned helpless tasks were administered, the Dweck Effort/Ability Subscale of the Crandall Intellectual Achievement Responsibility (IAR) questionnaire was given. This questionnaire represents one of the best researched measures of students' perceived self-responsibility for either academic success or failure in the classroom. The goal was to examine whether similar results would be obtained from the observation of actual task performance and immediate questioning as opposed to this traditional questionnaire self-reporting from memory format.

Results

An analysis of the data revealed the following information.

<u>Dweck Effort/Ability IAR Subscale</u>. Using Dweck's scoring, eight of fourteen visually impaired students scored within the learned helpless range.

<u>Expectancy for Success or Failure</u>. State school students were found to have twice the degree of expectation to

succeed when compared to students mainstreamed in the general education classroom. A comparison of the expectancy for success statements made by the seven students placed at the State School and the six students placed in general education classrooms reveals a great difference between the two groups. Because of the small number of students included in this pilot study, the generalizability of the results is questionable but it suggests some interesting implications.

The seven State School students made a total of 60 statements about their expectancies to succeed on anagram, line drawing, or puzzle tasks. Statements were made before attempting the task, after initial success, after failure, and after a final successful experience. Forty-seven of the 60 statements made by the seven State School students (78%) expressed an expectation to succeed on more than 50% of similar tasks in the future. In contrast, the six students from the LEA made only 19 of their 48 statements (40%) expressing an expectation to succeed in more than 50% of similar tasks in the future.

<u>Persistence Time</u>. Persistence time on insoluble tasks varied greatly among the students with visual impairments. Some students persisted no longer than four seconds per task. Others kept trying for as much as 325 seconds per task. There were no significant differences between students in the State School and mainstreamed LEA setting with respect to time on task or a particular type of Persistence Pattern.

<u>Persistence Patterns</u>. Of the 13 students with visual impairments in the study, four students (31%) presented *Persistence* patterns on both the anagram tasks and the line drawing or puzzle tasks. Two students were from the State School and two students were from the LEA. The *Persister* group averaged 170 seconds per insoluble task, nearly three minutes per task, the maximum time for most students.

Non-Persistence Patterns. In contrast, four students (31%) presented *Non-Persistence* patterns while attempting to solve the three insoluble tasks. The *Non-Persistence* patterns showed a decreasing persistence time pattern on both the anagram and line drawing/puzzle tasks. The *Non-Persistence* group average persistence time was slightly over one minute per task. This was over a minute and a half less than the *Persister* group.

Mixed Patterns of Persistence. Five students (38%) presented a *Mixed Pattern* of persistence and non-persistence while trying to solve the three insoluble tasks. The *Mixed* pattern group averaged 111.5 seconds per task, almost one minute less than the *Persister group* and 42 seconds more than the *Non-Persister* group.

Number of Trials. A comparison of the number of trials undertaken by students completing the line drawing tasks revealed that the four *Persisters* made 22 attempts averaging 11 attempts per student. The five *Mixed Pattern* students completing line drawings made 21 attempts averaging 7 attempts each. The four *Non-Persisters* made 16 attempts averaging 5.3 attempts per student or less than half the number of attempts made by the *Persister* group.

The students with *Persistence* patterns made more total attempts than students from the other two pattern groups. The *Non-Persisters* made fewer attempts than the students with *Mixed Patterns*. The data patterns of persistence time and number of attempted trials parallel one another; the *Persisters* tried longer and more often.

Attributions for Success and Failure. One of the more striking characteristics of the majority of the students with visual impairments was the brevity and poverty of their answers to open-ended questions about the causes of their success or failure (attributional responses). The 13 subjects made a total

of 39 attributional responses. Of these, 28 responses were one to five words (72%); 9 responses were from six to ten words (23%); and two responses were from 11 to 19 words (5%).

Implications

This pilot study should be replicated with larger sample sizes. Research is needed to relate learned helplessness or mastery oriented behavior to: teacher-student ratio; individualized attention; competitive differences between educational settings; self-comparisons with peers; class norms; teacher, parent expectations; and internal factors such as degree of visual impairment, mobility, language ability, or other physical factors. Teachers and parents should use teaching strategies to: increase the expectation to succeed, increase persistence time on difficult tasks, and help students with visual impairments become aware of the reasons why they succeed or fail.

Assessment and Early Intervention of Orientation and Mobility in Young Blind Children

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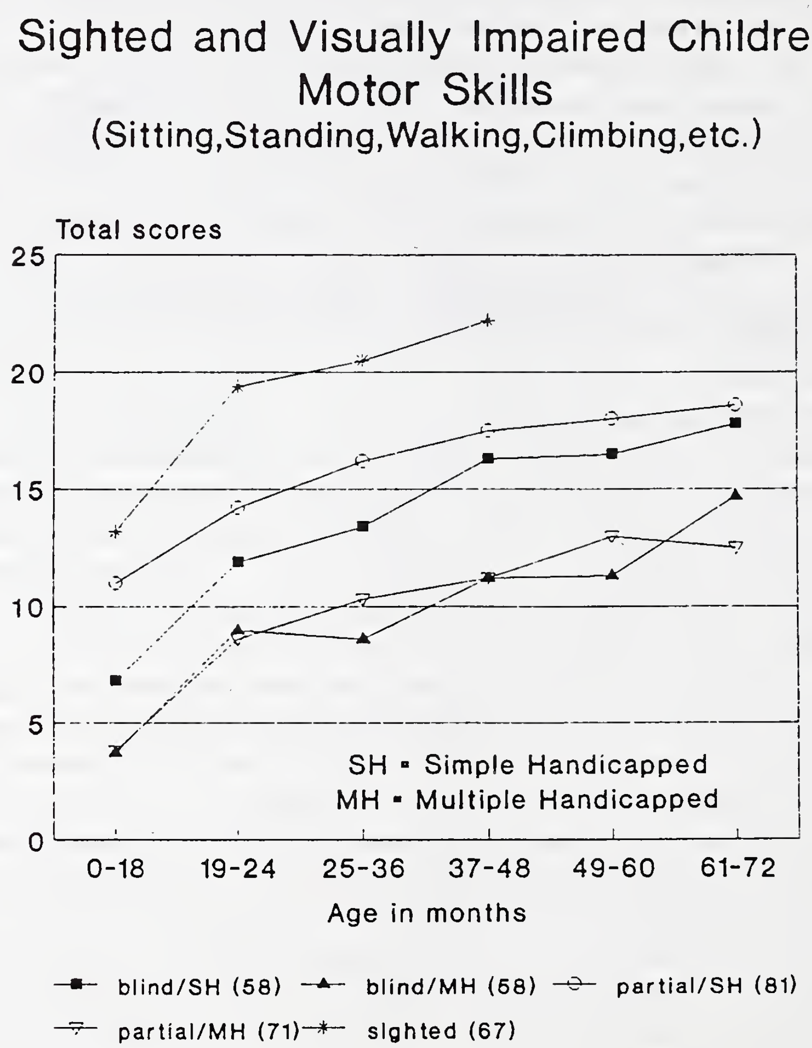
The Bielefeld Project has three main objectives: (1) to collect longitudinal and cross-sectional data on the development of congenitally blind 1- to 6-year-olds (*developmental aspect*); (2) to implement intervention measures designed to increase parental childrearing competence (*intervention aspect*); and (3) to evaluate the interventions from a formative and summative perspective (*evaluation aspect*).

One aspect of the project concerns the assessment, enhancement, and evaluation of orientation and mobility in infants and preschoolers. Currently, early intervention experiences are available up to the age of 4. Experience has shown that, in this age range, O & M training cannot be taught in the traditional way. Three main adaptations are needed: (1) The O & M exercises cannot be given in the form of a training (i.e., instructions) at this age. They have to be embedded in age-appropriate, blindness-specific play (e.g., "chasing" a calling mother to improve search and orientation performance). (2) Interventions cannot be restricted to O & M exercises but must cover all areas of development, because development at this age has to be understood as a transactional process (Sameroff, 1983) in which the enhancement of each area of development has reciprocal positive effects on all other areas. (3) O & M exercises have to be taught to parents, because they are the only persons who can carry them out daily within the framework of other everyday routines.

The Bielefeld Project is assessing the development of O & M skills with a standardized

developmental test, participant observation during the early intervention sessions, and a standardized parents' questionnaire (Brambring, 1992).

Figure 1 presents parents' reports on differences in motor development in various groups of visually impaired and sighted children.



As can be expected, sighted children are the quickest to acquire motor skills, while multiply handicapped, visually impaired children are the slowest. A three-way analysis of variance revealed significant differences for all three main variables: degree of visual impairment, additional impairments, and age. There was also a significant interaction between degree of visual impairment and additional impairments. In other words, the difference between simply blind and multiply handicapped children was stronger within the group of partially sighted children than within the group of blind children.

Table 1 presents the ages at which some selected O & M skills were acquired. This data is based on longitudinal assessments.

There were strong developmental differences between fullterm and preterm blind children (Hecker, 1994). Comparisons with sighted children confirmed the importance of vision for motor development. Comparative data are not available for the orientation tasks, because such data are not assessed in developmental tests for sighted children.

Table 1: Developmental Data of Full-Term and Preterm Blind Children

Mobility skills	Full-term (n = 5)		Preterm (n = 5)		Sighted
	Mdn	(Range)	Mdn	(Range)	Mdn
Pulls to stand	12.0	(10.5-13.5)	18.0	(13.0-22.0)	8.6[B]
Walks along furniture	13.5	(12.5-15.5)	18.5	(15.5-22.5)	9.6[B]
Stands alone, steadily	15.5	(13.5-21.0)	33.0	(24.0-41.0)	13.1[D]
10 steps alone	17.5	(15.5-20.0)	30.0	(24.0-41.0)	13.6[B]
Stairs (both feet on step)	18.0	(17.0-26.5)	46.0	(26.0- Y)	16.1[B]
Crawls coordinated	19.0	(14.0-23.5)	21.5	(19.5-27.5)	9.7[B]
Bends and picks up object	20.5	(17.5-25.0)	37.5	(28.5- Y)	13.6[D]
Hops with both feet	30.0	(22.5-49.5)	38.0	(28.5- Y)	25.7[B]
Rides tricycle	42.0	(32.5-51.0)	X	(32.0- Y)	Z
Orientation skills					
Points toward 3 body parts	16.0	(14.0-18.0)	33.0	(16.5-45.0)	17.5[D]
Finds loud object	17.5	(17.0-20.5)	32.0	(15.5-41.5)	Z
Follows calling mother	20.5	(16.5-21.5)	33.0	(26.5- Y)	Z
Finds mother behind obstacle	21.5	(18.0-24.5)	37.5	(28.5- Y)	Z
Goes into adjacent room	22.0	(20.5-29.0)	X	(42.5- Y)	Z
Finds silenced ball	24.0	(17.0-26.5)	37.5	(26.5- Y)	Z
Understands "in front of you"	31.0	(21.5-36.0)	48.0	(34.0- Y)	Z
Understands "object is in ..."	33.0	(24.0-46.5)	X	(33.5- Y)	Z
Names "object is in ..."	48.0	(36.0- Y)	X	(35.5- Y)	Z

Longitudinal data (up to 3 years of life: 14-day intervals; after 3 years: 4-weeks intervals).
X = not yet calculable; Y = 1 or 2 children have not acquired the skills up to 54.0 months;
Z = no data for sighted children available.
B = Bayley Motor Scale (1969); D = Denver Entwicklungsskalen (Flehmig, 1979).

One should begin to train O & M skills immediately after birth. However, "exercises" have to be adapted to the current developmental level of the child and the family situation.

In the *field of orientation*, important goals during the first years of life are the enhancement of: (1) attending to and orienting toward auditory stimuli and voices; (2) grasping of tactile-auditory, auditory, and tactile objects; (3) searching for loud, silenced, and silent objects; (4) following a calling voice at increasing distances and after changes in direction; (5) finding well-known locations within the home or outside; (6) comprehending and naming spatial relationships such as person-object or object-object relationships; and (7) detecting obstacles and enhancing the ability to relocate landmarks.

In the *field of mobility*, goals during the first years of life are: (1) improving muscle tonus; (2) enhancing the acceptance of different body positions; (3) turning over when supine; (4) controlling head and body when sitting down and standing up; (5) walking along furniture and walls; (6) stabilizing body control and coordination in unassisted walking; (7) coordinating performance of complex patterns of movement (e.g., climbing stairs, hopping, etc.); (8) using a preschool cane.

In blind children with normal motor development, use of the preschool cane is possible at the age of 3. Prerequisites for its use are: (1) satisfactory posture and balance; (2) reliable following of a calling voice; and (3) comprehension of simple instructions such as stop, look out, there's a step.

The Bielefeld preschool cane is a T-shaped handle made of aluminum with a rigid wheel on the end that children push before them with both hands. The primary objective of the cane is not to detect obstacles but to learn unassisted, coordinated

walking outside the home. The advantages of the cane are that it is: (1) easy to manufacture; (2) cheap; (3) easy for the child to lift because of its lightness; (4) it improves posture and balance; (5) it encourages unaided and rapid walking; (6) it provides feedback on the structure of the terrain and permits the detection of curbstones; and (7) its appearance is less stigmatizing for the child. The disadvantages are: (1) it does not protect the whole body, and (2) it does not train for future use of the long cane.

Experience has shown that the preschool cane could be used successfully in 6 of the 10 children in the project (all the blind children without multiple handicaps).

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THE PRE-OPTICAL AIDS' SKILLS

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After having shortly presented the Swiss way of working with visually impaired children, mainly in Lausanne (in the French speaking part of Switzerland), we'll present our study concerning the distance low-vision devices used by children. Finally, we'll discuss the pre-optical aids' skills as they've been developed in Switzerland.

Our pedagogical centre for the visually impaired children (C.P.H.V.) is the most ancient institute of the kind in the French speaking part of Switzerland. We provide services for children from birth to their professional training.
Most of the visually impaired children in the French speaking part of Switzerland are integrated in the neighbourhood schools. Those who cannot be integrated, for various reasons, come in residence to the school in our Centre on a full time or partial time basis. Our Centre provides an itinerent school-teacher for the integrated students.

All our low-vision children are examined in the ophthalmic hospital's low-vision clinic. The specificity of our low-vision clinic is that the ophthalmologist, the optometrist (optician)

and the low-vision trainer participate simultaneously in this consultation.

Our experience shows many advantages to the prescription of distance low-vision devices for young children.

For example:

a) It permits the child to be more aware of distant objects

b) It encourages him to explore new environments

c) It facilitates independant functioning

d) It helps him to build a positive self image

e) The child being less aware of his cosmetic appearance there are more chances that he will use his optical devices.

Our study tries to show when children start using optical aids, who uses them, where they are used, what the specific difficulties of children using optical aids are.

20 low-vision children between the ages 7 and 16 (13 boys, 7 girls) were observed and interviewed in our study. 10 children are integrated in the neighbourhood school, the other 10 are in residence in our school. Various pathologies are represented in this study. (slide)

When do children start using optical devices?

The yougest child to use distance optical devices in our centre was 7 years old. Although children are trained to use optical devices long before, they start using them regularly only when they're of school age.

Who uses optical devices?

As you can see on the slide, different pathologies are represented in our study. All these children use optical devices.

Although a measurement of visual acuity alone is no sufficient indicator of function, I would like to present the distance visual acuity of our subjects. These ran from a minimum VA of 0.06 to a maximum of 0.3. After adaptation of the low vision devices, their VA through the optical devices ran from 0.2 to 1.

Where are they used?

Our study shows that integrated children used their optical devices more frequently in class than the children in school in residence. Most of the children use their devices in their leisure time and for outdoor mobility. Some children (30%), especially adolescents, don't use them at all.

These results are very important for us as they can help us better understand the needs of our young population.

What are the most used optical aids?

65% use the hand held monocular telescope 4x (13 pupils)
25% use the hand held monocular telescope 8x (5 pupils)
10% use the hand held binocular telescope 8x (2 pupils)
None has a frame-mounted telescope.

Our intervention develops the different reasons which explain these results.

What are the specific difficulties of children using distance optical devices?

Most of the young children have problems focusing their devices, especially the congenitaly visually impaired children, as the concept of "seeing clear" has to be learned. (We'll see later how pre-optical aids' skills can help).

Social appearance, especialy with adolescents, is the second difficulty we've found.

Tiredness, especialy in class, seems to be the third difficulty.

Finally, the loosing and braking of devices were also observed.

The results of our study refers only to the children that have been seen in the ophthalmic hospital's low-vision clinic. It would be interesting to compare these results with other low-vision clinics in Switzerland and in other countries.

Our experience shows that some children use their devices automatically quite efficiently. Techniques like positioning, localising, scanning, tracking and focusing are easily learned.

"Pre-optical aids' skills" concern the different skills that a child must have developed before using optical aids. Acquiring these skills permits optimal use of optical devices. We propose five stages to describe the developpement of those skills:

1) Exercises without any optical device. Different exercises to encourage the child to better use any residual vision, and to try to maximize the use of vision. We work with his distance vision without any optical aid.

Special attention is given to the motoric developpement of the child. Some specialists as the psychomotrician and the occupational therapist are also involved in developing those skills.

2) Before introducing the optical device, we propose different games which involve optics and help the child to understand the limits and possibilities of his optical device (slides of different examples). These exercices also help to develop proper eye-hand coordination. (slide)

3) Then start to exercise with a low power monocular aid with a large visual field.

4) Then, short activities using the prescribed optical device in a controled environment with some physical adaptation regarding lighting, contrasts, print size.

5) Activities with the prescribed optical device in non-controled conditions.

ORIENTATION AND MOBILITY (O&M):
THE EARLY YEARS OF INFANCY THROUGH PRESCHOOL

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Introduction

Over the past several decades, the profession of Orientation and Mobility (O&M) has revised its teaching strategies to focus upon the needs of young children. Within the past five to ten years, a particular emphasis has been placed on the early O&M skills specific to infants, toddlers, and preschoolers who are visually impaired.

With the inclusion of the birth through age five population, the field continues to refine both instructional philosophy and actual teaching techniques. Both have required careful steps; the process of merely "watering down" methodologies which are appropriate for older children has not always proven effective with very young children.

Research on the developmental route of the child with a sight loss has been helpful, but further research is still needed. Areas of specific challenge in each developmental domain have been documented. Based on this information, specific intervention methodologies have been devised, only to be revised with the contributions of new findings. It is fair to note that early intervention for children who are visually impaired is still within it's own toddlerhood of development.

A Proposed "Formula of Purposeful Movement"

Based on current research findings, it may be supposed that three primary areas emerge as important program domains within an early intervention O&M program. A "formula of purposeful movement" is offered for consideration which includes the following three components of program attention: physical readiness, cognitive connection, and motivation invitation.

Physical Readiness

Past research by Selma Fraiberg did not indicate that visual impairment has any effect on the order of gross motor milestone development. This may be changing, however, from the current longitudinal study in progress by Dr. Kay Ferrell and colleagues. Project PRISM is currently collecting information on the sequence of developmental milestones. Gross motor development may be an area of noted unique skill acquisition order.

The rate of gross motor milestone development may be influenced by a visual impairment. There is evidence of delayed movement postures. This may be due in part to the possible presence of low postural tone, and the interdependent relationship of movement and the acquisition of true object permanence and/or auditory localization skills.

Physical readiness, however, far exceeds the mere acquisition of typical gross motor milestones of sitting, crawling, walking, and so on. It encompasses both quantity of skill acquisition and quality of movement. It is critical that motor milestones have qualitative excellence.

Quality of movement depicts the "underlying scaffolding" of both the static and dynamic postures of the child. It refers to the level of refinement of a particular gross motor skills. Without vision to confirm the infant's early body movements, the sense of proprioception may not develop to full maturity and low postural tone may be evident.

Brown and Bour (1986)report on one theory that the reason many babies who are visually impaired have low postural tone is because of a lack of experience in the prone position. Limited opportunities in this position ultimately deny the child the needed proprioceptive stimulation for neuro -motor development.

Low postural tone often will compromise the refinement integrity of motor skills involving balance and strength. Balance reactions, trunk rotations, and actual motor milestones may be influenced. For example, a child may be able to sit independently, but the actual sitting posture may be compromised. A rounded back with the legs situated far apart may be the only way the child can achieve independent sitting. Due to low trunk tone, the child may need to establish a wide base of support to maintain an upright sitting posture.

Compensatory patterns such as these may become habitual. If repeatedly used over time, the child is at risk for physiological change in her muscles; some may lengthen and some may shorten to accommodate for the compensatory posture. If left untreated, it is possible that an orthopedic deformity such as scoliosis may develop (Campbell, 1983).

It may be wise to consult with a physical and/or an occupational therapist to ensure that the child's motor skills are developing in a manner that reflects good quality of movement. Attention to positioning and special activities to strengthen the trunk muscles are two ways to address the influences of hypotonia. With consultation from a motor therapist, these activities can be easily incorporated into the child's daily care activities.

Cognitive Connection

Three stages in particular have great influence on the child's acquisition of early travel skills: (a) attainment of object permanence, (b) development of means-end, and (c) the early constructs of spatial relations. As each area is reviewed, it will become evident how one skill area is developmentally intertwined to other skill areas. It is impossible to fully isolate one from the other. For simplicity, however, they will be discussed as separate behaviors.

Object permanence in lay person's terms is simply "out of sight, <u>not</u> out of mind." During the first nine months of life, the infant does not have the memory capacity to search for an item completely removed from view, or in the case of a child with visual impairment, out of touch.

During this time period, however, the sighted infant demonstrates steady progress in the area of memory and search skills. At approximately four to six

months of age, she will find an object that is touching her body (Johnson-Martin, Jens, and Attermeier, 1986). These authors further report that the sighted infant will briefly search for a newly dropped object and deliberately uncover a partially hidden object at six months of age. By nine months, the infant learns that an object continues to exist even if it is covered from view. A favorite interaction game at this age is the classic Peek-a-boo.

Selma Fraiberg (1968) noted that sound is not a substitute for sight; between six and seven months of age, hearing and holding are two separate events for the child who is blind. Her research noted that the beginning of search behavior occurred between seven to nine months of age.

The child who is visually impaired may have a unique timetable as she acquires skills leading to object permanence and more sophisticated memory. Her individual level of functional vision will play an ongoing role in her ability to discern a world outside of immediate touch.

The ability to problem solve with an end result goal mind is called *means-end*. This indicates that a child is able to understand what means (actions) will result in a certain end (result). Over the course of the first two years, the child learns to construct a simple goal, then use the motor skills within her repertoire to achieve that end result.

The young infant, however, does not initially realize that her body movements knowing produce a certain sensory result. Body movements are not associated with reactions such as the visual movement of a swatted mobile or the chime bells of the kicked chime ball toy. During these early days, the infant is practicing newly acquired volitional movement as motor reflexes are fully integrated. Movement occurs for the sake of movement alone.

With repetition, however, the infant begins to discover that her body movements can make something happen. One of the first indications of intention occurs with deliberate hand watching behavior. With the discovery of her hands as a "working part" of her body, the four month old infant learns to reach for nearby objects.

Tactile cueing may be necessary to help initiate a reach of a desired object. As the child becomes more proficient with her understanding of a world beyond touch (expansion of object permanence), these touch cues will become less necessary.

Other means-end behaviors include early tool use. The child learns to pull a string to obtain the attached toy or use a stick to acquire a toy just out of reach. Clarke (1988) reports that tool use has great implications for a child's ability to successfully use a mobility device or long cane during the toddler and preschool years of development.

As the child expands her understanding of the space beyond her body and has the physical readiness to move out into space, the reach is extended from an isolated arm to a full body movement. This is the hallmark passage of purposeful movement; the child can begin to use self propelled ambulation for an end result. Her worldly travels have begun from a mobility perspective whether in the form of a roll from back to front or a long stretched reach while

in a prone position that results in forward movement toward the object of interest.

Spatial relations development involves the concept formation of position, location, direction, and distance from one's own body (Morgan, 1992). Spatial constructs have three primary categories: (a) spatial awareness of one's body, (b) awareness both near and distance space as it relates to one's body, (c) awareness of the space dimensions between objects. All three of these areas have developmental beginnings in infancy. Each area will be briefly discussed as to the associated developmental skills during the first two years of life.

The infant learns about her body as people touch and move her. Baby massage is an excellent means of proprioceptive input to the infant concerning the spatial dimensions of her body. Touching interaction games such as "I'm going to get you!" and a variety of body positions are also natural teaching methods of body image.

Dressing and undressing activities also play an important role in the internal mapping of the child's body. Dressing and bathing routines will further shape a child's labels of her body parts.

With maturation, the infant will master voluntary movements such as hand watching, midline hand play, and bringing her feet to her mouth. These movements give her even more information about the dimension and parts of her body as they are self regulated. As the infant reaches for her foot, she is participating in the discovery and confirmation of where her feet are located on her body.

Coinciding with spatial mapping of her body, the infant will begin to explore the immediate parameters of the world around her. Toys located on her body and next to her body will be the first ones explored. As she has repeated reinforcement for her random movements out into space, she will begin to actively search for "what is out there." Organized play areas with defined spatial boundaries and content will soon invite her visual and tactile search for people and toys.

Motivation Invitation

The human spirit needs both encouragement and reinforcement to work and to play. For the young child, it is important that the efforts associated with movement be met with inner delight, of intrinsic reward.

A child who is engaged in the activity at hand, will be more willing to take a risk such as moving out into new space to continue an activity. In the beginning, it may be as simple as a slight weight shift from one side of the body to the next as a toy is offered in a slightly different location. Later, the child may independently navigate across an open space just to get a hug from her parent.

The goal is to determine what is motivating for the child. Two factors usually create a successful motivator; the child's cognitive development level and sensory preferences. It may be the thrill of reaching toward a colorful music

toy for the infant with low vision or the satisfaction of walking across the room to the high chair for an afternoon snack for the toddler who is blind.

SUMMARY

It is important for all children to be explorers of their world. The gift of self initiated quality movement in the early years is a priceless and lasting one. Early attention to the child's development from an O&M perspective can offer intervention at a critical time in the child's life.

Meeting the child at her developmental level will greatly assist O&M practitioners when working with families and other team members. All three of the suggested components can be readily infused into the daily routine of the child. The result will hopefully be a supportive and involved family, a cohesive early intervention O&M program, and a child who moves out confidently and successfully into a world of new learnings.

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Project PRISM, ongoing longitudinal study by Dr. Kay Ferrell and colleagues, University of Northern Colorado, Greeley, CO.

COMMUNITY SUPPORT IN SUCCESSFUL INTERVENTION ACTIVITY FOR INDIVIDUALS

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In each period throughout history, conceptions and ideas regarding the visually impaired and the services and support that they need have been devised according to the ideological frameworks accepted by the societies to which these individuals belong.

The beliefs that each society and period hold about the visually impaired have a significant influence on the conception and practice of rehabilitation, which vary widely with each change in a cultural environment and suffer the, at times, chaotic influences of these changes.

In most of the western world, the philosophy behind rehabilitation is formally based on the recognition that the visually-impaired individual is a full-fledged member of his community, and as a result, must be guaranteed complete practice of his condition as a citizen.

Nevertheless, when services are created or offered according to this philosophy, we must ask what objective we are trying to reach when speaking of "rehabilitation".

If we consider rehabilitation mainly in terms of work centered on the individual, we will most likely concentrate on creating and developing specialized institutions that focus their intervention activity on providing pedagogical, social and therapeutic services based fundamentally on the learning of specific techniques (orientation and mobility, daily living skills, and

communication systems, etc.) and which are centered around a person's impairments or deficiencies to allow him to function on the same level with others. In this sense, intervention activity is based on the consideration that the individual belongs essentially to the sub-group of the visually impaired. As such intervention activity meets its intended objectives - to alleviate or minimize the dysfunctions which visual impairment can cause in an individual's life - however, its efficacy is limited within the very philosophy and community in which it is carried out.

We would dare to claim that many of the "problems and failures" currently experienced by the visually impaired are largely the result of the environmental conditions in which they must function (family, community and physical setting). A visually-impaired individual often sees how he loses part of his identity as a citizen when his capacity to lead his life according to his own criteria and responsibility is denied or restricted. He passes from being an active member of his community with a distinguishing characteristic to being a subject that requires intervention activity as part of a stigmatized group.

He is "required" to assume his new condition and learn to function in an aggressive physical environment in which others tend not to interact socially with the visually impaired or interact with them inadequately, and in which they must respond according to the image that society expects of the group.

In this sense we feel that the concept and philosophy behind rehabilitation should be taken a step further so that it can be understood as a whole that is largely dependent on not only the specific training received by a visually-impaired individual, but the attitudes and desires which the family, community and even the professionals themselves who work in the area have regarding it.

From this perspective, intervention activity should not be centered uniquely around specific training programs, but should go beyond them and begin to organize work which, when carried out in the heart of the community, home and rehabilitation centers themselves, has an influence not only on the individual but on the entire community.

The advantage of this overall focus for rehabilitation is the possibility of using a combination of strategies needed to have an effect at different levels. In this sense a combination of different measures used to determine the forms in which services are to be provided and the kind of program to be applied is essential. Analysis and action should go hand-in-hand at every strategy level.

The range of factors used in analyzing what could appear to be an exclusively educational problem will have an influence on the scope of the solutions proposed.

Because our time is limited, I will not attempt to go through an exhaustive review or even a satisfactory synthesis of all of the strategies for action which could be developed to carry out the concept of "overall rehabilitation", and I also do not wish to give the idea that a correct analysis of the factors influencing a community or group and an adequate strategy for action will eliminate overnight the difficulties experienced by the visually impaired in their communities and groups.

Nevertheless, I do not wish to end without mentioning - though briefly - some of the work already carried out or presently being carried out in Spain, which goes beyond activity centered on the visually-impaired individual and his group of reference and in which active participation on the part of the rehabilitation professionals and the visually impaired is favoring greater sensitization and understanding in society of the problems experienced by the visually impaired; this

understanding and sensitization is allowing for fuller and more gratifying interaction between the visually impaired and society.

The video which we are now going to see shows some of the work that has been carried out. (the video shows GROUP TRAINING, PARTICIPATION IN NATIONAL EVENTS, STUDIES ON THE PHYSICAL ENVIRONMENT AND PROPOSALS FOR SOLUTIONS, and other projects).

IMPORTANCE OF FUNCTIONALITY AND GOAL-DIRECTED ACTIVITY IN MOBILITY TRAINING

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The term 'functionality' incorporates two important aspects. The most important one is that mobility training should give an understanding of why mobility skills are necessary for reaching a desired goal. For the individual, this enhances motivation and affects plans for daily life challenges. Functionality in this sense implies activity related to functional goals, which is intrinsically motivating for performance.

The second aspect signalled by the term 'functionality' is the demand for integration of mobility training in a total plan for habilitation or rehabilitation. This requires an analysis of the individual needs within a larger perspective. By integrating mobility in a total plan, mobility training becomes more significant for the educational goals for each individual, and may frequently function as a frame for development of daily living skills, language and communication. In the present paper we argue that these two aspects of functionality can be met in a method based on mobility route training.

<u>Goal-directed activity, plans and motivation.</u>
Human spatial movement usually takes place for some particular purpose, is deliberate, and is often associated with solving a problem. Mobility and orientation skills are in this respect functional for reaching desired goals. To perform competently in the environment, the individual must choose an organizing perspective, - a plan. In

spatial problem-solving a plan, or goal, crucially affects behaviour in a way that one particular aspect rarely does. A plan specifies necessary prerequisites for the activity, as well as situational uncertainties as to how it should be carried out. It introduces a new type of relationship between the individual and the environment; specifying a set of operators, or actions, within a relevant problem space.

To be competent in mobility implies choosing a plan which makes it possible to move to a desired goal. In functional mobility training the consequence of this is analyses of individual needs, and defining goals related to authentic, ecological valid, problems, i.e. challenges met in everyday activity. The emphasis on ecological validity, inherently links motivation to the execution of individual plans.

When understanding why an activity should be performed, individuals effectively learn relevant skills. Hence, the goal-object is essential for establishment of some features of cognitive structure, how to represent the mobility problem. That includes knowledge of what steps or moves are possible for reaching a goal. Functional goals thus both motivate a search for a path, and representation of the problem. Consequently, ecological validity is an inherent aspect of the reasoning process.

The effectiveness of mobility route training.

Mobility route training has for some time been integrated within individual plans for habilitation or rehabilitation at 'Tambartun', The National Resource Centre for Special Education of the Visually Handicapped in Norway. Generally, acquisition of mobility skills positively influence the individuals level of activity and sense of well-being. Furthermore, mobility route training seems more significant for intellectual and social development, as well as language and communication, than traditionally assumed. A consistent pattern of development is found in mobility route training. In learning to travel a route independently, several qualitative shifts are observed.

Firstly, attention typically appears as anticipations to landmarks. Anticipations, or preview, may take many forms. Most frequently, the individual slows down, speeds up, or stops while travelling in a route. Anticipations also appear as changes in directions and usage of the

cane, and in protective actions as lifting, or lowering the arms. Frequently, subjects talk about the landmarks, or show joy and excitement immediately before reaching them. Such anticipations indicate discovery of new relations or qualities, associated with the landmarks.

Secondly, anticipations is often followed by communication related to the landmarks, even for individuals with relatively poor ability to communicate. Success in mobility routes triggers communication about actions and experiences in searching for a goal. Thus, mobility routes frequently function as a frame for the development of language and communication. A feeling of success does not only motivate mobility and orientation. It also positively affects the development of other, important, daily life skills.

Thirdly, when the individuals become more proficient in travelling the route, attempts to modify skills, techniques, and use of landmarks, may be observed. They become more attentive towards appropriate cues, include additional ones, and exclude others through taking short cuts in the route. This kind of reorganization of the travel plan, suggests a spatial understanding, which is not restricted to recognition of landmarks and turns in the route. Spatial understanding and orientation skills, may appear as the ability to communicate about objects, events and places in a space, pay attention to landmarks, and to modify the search plan.

<u>Mobility route training and coping with daily life</u>.
In mobility and orientation, it is mandatory to prepare for functional route training in relation to both aspects incorporated in the term 'functionality'. Referring to the first aspect, the individual must understand why mobility skills are necessary to reach desired goals. If so, training of mobility skills become functional to goals relevant for coping with daily life. In practice, this often implies that the mobility teacher initially must focus on mobility routes that represent the solution of a real, or authentic, problem for the individual.

Referring to the other aspect, a demand for authentic goals requires an analysis of the individual needs in a larger educational perspective,

which is significant for habilitation and rehabilitation. Functional mobility route training not only affects development of mobility and orientation skills, but may also function as a frame for developing language, communication, and understanding of social relations.

Mobility route training frequently affects initiatives to take part in other activities. The experience of success may thus be regarded as an effect of experiences associated to coping with daily life challenges. The feeling of success in travel creates a feedback chain, which triggers other activities and goal-directed movements. Using procedural knowledge to reach goals, implicates learning how-to-do-it to make other desired goals available. Procedural knowledge utilization leads to goal-directed activity, which implies acquisition of declarative knowledge, and eventually associates with orientation skills.

In our opinion, mobility training must have a more central and comprehensive role in relation to habilitation and rehabilitation. When mobility training is integrated in a total educational plan, and adjusted to functional goals for the individual, it becomes effective as a means for coping with the problems of the blind population. In this perspective, learning of mobility skills frequently triggers initiative in other activities, language and communication, and a feeling of being comfortable in daily life. In a wider perspective, mobility route training counteract passivity, which is a major problem for many blind people.

The experiences with a functional use of mobility route training, described in the present paper, contradict the common assumption that it is necessary to establish declarative knowledge through preparatory training of basic mobility techniques and orientation skills. Successful performance in mobility and orientation does not depend on spatial knowledge and mobility skills learned out of a functional context. Many blind people often perform successfully on such out-of-context tasks, but still remain passive. They have learned about objects, events, and places out of functional contexts, but not learned how to use such knowledge to obtain desirable goals. Many blind people do, however, show ability to obtain goals through mobility route training, albeit they have poorly developed spatial understanding and orientation skills.

DEVELOPMENT AND VALIDATION OF O&M OUTCOMES IN VA'S BLIND REHABILITATION CENTER PROGRAM

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There is a great deal of anecdotal evidence that documents the benefits blind and visually impaired individuals' receive from orientation and mobility (O&M) training. However, there has been little systematic study of the outcomes of O&M training. As a result, policy makers and service providers are unable to answer fundamental questions about the impact of O&M services on recipients' travel habits or, from a broader view, their quality of life. Little is known, for example, about the travel habits of consumers before and after they complete O&M training, and the degree to which they apply skills learned in training in their home environments? The impact of demographic factors, such as age, type and degree of visual impairment, and family influences has not been studied in relation to independent travel. Issues of efficacy, or the relationship of gains in O&M skills to various modes of service delivery, have not been explored, nor have issues of benefit as a function of cost.

One reason for the lack of research on the outcomes of O&M is the lack of reliable and valid measurement tools by which to measure O&M performance or the outcomes of training. There appears to be no commonly accepted, widely used measures of

specific O&M skills (e.g., street crossing ability, ability to detect and avoid obstacles) or overall travel habits (e.g., frequency of travel in various environments). To address the need for measurement of the outcomes of O&M training provided by the six blind rehabilitation centers supported by the US Department of Veterans Affairs, my colleagues John Crews, Ricki Mancil and I undertook a major research project. This project, supported by the Rehabilitation Research and Development Service, U.S. Department of Veterans Affairs, is entitled "Development of the Functional Independence Measure for Blind Adults", abbreviated *FIMBA*.

The *FIMBA* project, which ends in December, 1993, has yielded a number of products. First, we have developed a structured interview protocol, called the Preadmission/Postdischarge Interview, that permits us to systematically collect data on veterans' self-reported abilities in 24 functional tasks, including communications, daily living, home care, and O&M related tasks. Data include from the interview protocol include ratings of frequency, difficulty, and satisfaction with task performance. The O&M tasks included in the interview are:
1) travel outside your house and yard by yourself
2) cross a street
3) go up or down curbs
4) go up or down stairs

In addition to the interview data, we have developed a clinical assessment tool for use by O&M specialists in obtaining quantitative ratings of overall O&M performance and performance on selected subskills. This clinical assessment tool, developed with input from VA O&M supervisors and staff, involves rating clients on a seven point scale on three safety-related tasks and three efficiency-related tasks. The safety

related tasks are avoiding obstacles on the travel path, maintaining balance, and crossing streets. The efficiency related behaviors are following route directions, maintaining an efficient line of travel while negotiating obstacles, and locating a destination.

The *FIMBA* measurement tools in O&M are being used by VA blind rehabilitation personnel across the country. Preadmission and Postdischarge Interview data are being collected from veterans prior to or at entry to a blind rehabilitation center and approximately three months after discharge. As of October, 1993, we had a total of 351 Preadmission Interview protocols and 24 Postdischarge Interview protocols. Crossing streets was rated as "very difficult" or "somewhat difficult" on the Preadmission Interview by 65% of veterans, and 55% reported they were very dissatisfied or somewhat dissatisfied with their street crossing ability. About 50% reported that traveling outside the house and yard and going up and down curbs was "very" or "somewhat" difficult. Post-test data are not available in sufficient quantity at this time to evaluate whether completion of a residential rehabilitation program that includes O&M services reduces reported difficulty in performance of these tasks or increases satisfaction and frequency of task performance. We believe that such gains will be evident when we have adequate data to conduct such analyses, and that these gains will provide evidence of the value of O&M training. Further, we believe a relationship will be found between self-reported quality-of-life and level of self-reported O&M ability, a finding that will provide support for the value of O&M training.

As with the self- report data, we do not have an adequate number of clinical ratings of O&M performance to conduct meaningful analyses. At the International Mobility Conference

in Melbourne, we plan to report a complete analysis of the reliability and validity of the clinical rating data in O&M. We also plan to report the degree to which O&M clinical ratings change as a result of O&M training. We believe that improvements will be noted in each of the six behaviors rated, and also in each of the three environments where evaluations are conducted (i.e., indoors, small business area, residential area). We believe that the sum of the 1-7 ratings of the six behaviors is a reasonable proxy for the quality of overall task performance in O&M, and thus gain scores are reliable indicators of overall improvement in O&M. In addition, we believe that analysis of specific gain scores in such areas as street crossings or obstacle avoidance will be useful in determining the relative impact of various approaches or emphases in training. The self-report data of satisfaction with performance on various tasks, in combination with the clinical ratings obtained prior to initiating training, should permit O&M trainers to focus on skills of value to clients and those on which they need improvement. We believe that *FIMBA* O&M data is useful not only as a means of tracking outcomes of large groups of veterans but is also potentially useful in individual program planning.

Finally, we intend to conduct analyses of the relationship of self-reported O&M ability to clinical ratings, and to determine the amount of variance in O&M clinical ratings that can be accounted for by demographic variables such as age, presence of other disabling conditions (including hearing loss), and severity/duration of loss. We believe these regression analyses will help us "profile" specific types of veterans at risk for significant O&M disability, and will thus help us focus more limited training resources more appropriately.

CONTINUING EDUCATION PROGRAM FOR PROFESSIONALS IN THE FIELD OF REHABILITATION OF THE BLIND AND VISUALLY IMPAIRED

Nurit Neustadt

In less than 50 years since Orientation and Mobility started delivering services and gaining recognition, the trend of the majority of served population shifted from totally blind adults to Low Vision elderly, and the Multi-handicapped.

If we put these factors together in addition to the overwhelming developments in technology, we can come to the conclusion that there is a need to provide both: broad base and specialized on going programs of Continuing Education for professionals currently practicing in the field.

Most of you I guess agree with the statement that we must update our knowledge, otherwise you would not have been here today. But, we are just the minority of practicing Orientation and Mobility needing Continuing Education programs.

So what to so about these continuing Education needs?
First we must identify what Continuing Education Programs are needed on a longtitudinal basis.
we must go to the field and learn what practitioners Orientation and Mobility specialist are actually doing in their routine work load.
What are their frustrations and how do they meet the challenge of the ever-changing population and technology.

A few studies have been done in the USA, just to mention one, conducted in the 1980ies by Beliveau and De l'Aune, on the role and functions of currently practicing Orientation and Mobility specialists.

The results of their survey indicated that what the Orientation and Mobility specialists perceived as their greatest Continuing Education needs, or the kind of information they needed correlated to their needs to meet their students needs.
They also found that Orientation and Mobility specialist wanted more updated information and education on topic such as: Low Vision, Multi-handicapped populations, Technology, and Elderly.

Later in the conference you will also hear from Duane Geruschat a report on a survey conducted at IMC6, which gives an international outlook to the Continuing Education needs of Mobility specialists. In general the report reveals the needs expressed by the surveyed professionals as being in the areas of Muli-handicapped populations, functional assessment of Low Vision, and vision stimulation.

So we know what the field is telling us it needs. But, what remaining is the problem of how to meet these needs. The answer is as complex as the problem is.

There is no one best form or model to meet our field's Continuing education needs. We must stress a variety of approaches that will take into account local, national and international factors such as:

a. The amount and level of personnel preparation experience.
b. The profile of the population they serve.
c. Geographical accessibility to training. (for example in some cases tele-conferences would be more feasible than local meetings).

We could rely on conferences such as this one. Only it comes once every 2-3 years and at different and for many too distant locations and regions.
We should encourage the use of current or the founding and

establishing of local organizations and professional associations to take a leadership role in maintaining and updating professional growth through on-going seminars and conferences.

We should maintain an on-going exchange with and among professionals on national and international levels. But need something like a clearance house for update information and publications which could perhaps provide availability of services such as bibliography, book reviews, copying services etc. The service should also include lists of Orientation and Mobility specialist world wide, their specialty areas of expertise. In effect a specialized information date base, including access to speaker services.

We should maintain close contact with personnel preparation programs to inform them about the practitioners needs.

We should maintain a close contact with university based programs and involve them more out in the field by providing out in the field courses and supervision, especially for those of us who are working at remote areas and are getting so little on-going supervision. Such a Continuing Education efforts is made by Pennsylvania college of Optometry department of Graduate studies in vision impairment, which offers individualized or pre-arranged Low vision seminars for periods of two days to two weeks and take their program to the area or country interested.
Another effective channel of Continuing education learning would be through professional journals.

On model of Continuing education which I wish to introduce to you is the one developed by The Carroll Center for the Blind 770 Center Street Newton MA, one of the leading rehabilitation centers in the USA.
This model addresses several Continuing education needs and tailors the program to the six individual participants each

summer session. The program lasts for eight weeks nd is very intense. It offers muli-dimensional learning opportunities for experienced Orientation and Mobility specialists, Rehabilitation and Communication instructors in addition to Educators and administrators of blindness systems.

The curriculum includes:

- supervised skill practice in the area of the participants' expertise
- learning and mastering new skills
- theory classes at Boston college
- study tours of a variety of local, national and international agencies
- seminars comparing services for the blind around the world
- lectures by Carroll Center's senior staff and notable nationally known professionals
- writing a paper for publication based on library research and practical experience
- establishing a professional network
- informal exchange

The slide presentation following this talk gives a better idea of the programs activities and a profile of its participants.

To date over 30 participants representing 20 countries graduated the program since it was established in 1988. Their basic training level varies from a few weeks to graduate programs. But, they all earned at least three years of experience in the field. In addition they were all eager to update their knowledge and enhance the level of their professional expertise.
The participants highly evaluated the program and the unique experiences they gained. They correspond among themselves and also contribute to the circulating Newsletter where they share with all other graduates their applications on new ideas introduced during the program and their achievements.

ORIENTATION AND MOBILITY TRAINING AND COPING STRATEGIES.

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At "Het Loo Erf" a residential rehabilitation center for visually handicapped adults, most clients are adventitiously partially sighted. This contribution I want to restrict myself to this category and its coping with emotional problems and feelings in general and more specific with respect to mobility performance.

Most eye diseases produce a gradual reduction in vision or provide significant warnings of the eye pathology, so an individual can begin to cope with the impending loss of vision. This is not the case with sudden blindness, when psychological adjustment mechanisms are altered and the individual does not have time to integrate the experience into the personality structure.

Maintaining health is obviously dependent of adequate coping with stressful life events. Some people use to react in a standard way to stress, others are using different reaction types but with some pattern in it, but there are also people who are really flexible, who can choose different coping-styles dependent of their assesment of the stress-situation. The emotional adjustment in case of adventitious blindness or partially sighted, concerns the acceptance of the irreversibility of the visual impairment and its effects. In O en M training, I think this point is one of the main influences at psychological processes that underpin succesful travel.

Researchers have found that, in spite of the best efforts, the impact of O and M training had been disapointing looking at the poor correlation between the amount of training received and the later use of mobility skills by clients. This failure to make as much impact as was hoped is acknowledged by practitioners who recognize the importance of psychological factors in mobility. *(Beggs, 1991)

I do think that basic mobility skill training, learning how to protect and orientate yourself is very important. It might be a start to give a client feelings of safety, self-confidence and to be independent to some degree. However it is no magic. Still remains, very often, the problem of the emotional acceptance of being visually handicapped.
Essential in the development of positive emotional adjustment are the concepts of identity and identification. There is a close relationship between the concept of identity and the concept of social role. People play roles and they can play these roles only adequately, i.e. without too many conflicts, if they have integrated these roles into their personality.

Emotional resistance to a new role may influence O an M lessons and has direct consequenses for trainingsubjects and methods. O and M training can be used as an instrument to become aware of copingstrategies or trying to change them in stressful situations. In confrontation with reality we should keep following rules in mind:

- Diminish the chance of negative effects and increase the chance of positive effects of the clients behaviour.
- Make the appraisal of effects less extreme in the sense of "very positive" and "very negative".
- Promote the idea that one may have control. This very last aspect seems to be the most difficult one..

To be succesful in obtaining compensating skills, positive motivation to active adjustment is essential.

As an illustration I'll tell you about our client Misses J., 40 -years old, adventitiously partially sighted caused by Retinitis Pigmentosa. The effects of RP occured since some time but client thought that minor accidents were due to her own clumsiness. Slight readingproblems motivated her at last to visit the opthalmologist. He diagnosed RP and told her, that she might even become blind.
From that moment on her visual handicap became actual. In fact she suddenly became visually handicapped.
Client more and more experienced problems in unknown and crowded situations. Anxiety and fear in both social- and mobilitysituations caused severe avoidingbehaviour.
After a short period of professional assistance in a regional center , she came to our center because of the complexity of her problems.
On admission her vision was limited to a very small tunnel vision only of her right eye, acuity 3/30, with her left eye she only saw light and dark. Although she bought a white cane two years before admission, she only used it once, crying before the mirror in her bedroom. After that, she threw it away into a wardrobe and never used it since.She was very much motivated to act "normal" again. Although, rationally she knew she needed the cane and some non-visual compensation training, she wasn't ready for it. She didn't want to be recognized as a visually handicapped person. That's shortly about the situation as it was as she came to me for O and M training.

After making an hierarchic list of frightening situations and conducts we started a behavioural therapy program. In the beginning the client was exposed to situations giving few anxious or negative feelings and later on more frightening situations using the white cane (or thinking about it).In this fase, in which at last she was

encouraged to use the white cane in her own home situation and shopping center, we also payed attention to her irrational thoughts and at the end of each meeting we also tried to relax, e.g. in letting speak out her mind.
She was very suspicious in getting compliments. Instead of giving herself compliments, she gave them to me. So I tried to let her speak out what she had learned and done in previous lessons, compared with her admission situation.

To get things straight, not all adventitiously partially blind clients have this emotional resistance. It seems as if they don't have any resistance but that may be a false supposition. In some cases we found a kind of rational reaction to the fear of losing sight completely. Under this rational decision lies in fact still anxiety and the nonacceptance of the disabillity. *(B.Wouters, 1991)

Finally:
Coping behaviour is in fact the realisation of choices which the coping person makes. He can try to change the problem, to change the attitude towards the identified problem or to change the emotions connected with the existance of the problem. In my opinion, an O and M trainer can and has to pay attention to these choices.
We must always be aware that there is not one good way of coping. Every coping style has its advantages and its disadvantages, dependent of the situation and of the person and his characteristics. Crucial is the answer to the question: "Does it work?"

* Beggs, W.D.A. (Journal of Visual Impairment, March 1992) - Coping, Adjustment and mobilityrelated feelings of newly visually impaired young adults.
* Wouters, B. (1991). - Emocialno prisposobyavane k'm rolyata na chastichno -vizhdashtite. Tserk, Plovdiv. (Emotional adjustment to the role of partially sighted.)

"INDEPENDENT LIVING OF THE VISUALLY IMPAIRED PEOPLE IN GREECE" (PAST AND PRESENT)

Miss Katerina Poulea

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Ladies and Gentleman "Good Morning". My name is Katerina Poulea and I'm working as a Mobility and Daily Living Skills Instructor in the Panhellenic Association of the Blind in Greece. I have the great luck to represent my Country and my Orientation and Mobility team in this International Mobility Conference (IMC-7).

Yesterday when I came here and after my first contact with some of you, coming from different Countries, I realise that Greece is well know for it's ancient culture, its physical beauties, it's great islands, but concerning O & M it was like it doesn't exist.

So when I heard that finally my colleague didn't manage to come in this Conference, I took the opportunity to make a small presentation of the Greek reality in the field of O & M development.

I want to apologise for my pronunciation - it's not the best one - and about the anxiety you probably understood that I have. Believe me it is a big step for me to talk in front of an audience in my very first participation in a conference like this one, but I would never allow myself to miss this great change.

In Greece there are about 21,000 visually impaired people in a population of 10 million. The 75% of them is over 55 years old as it happens all over the world.

The main reasons of blindness are more or less already known - Cataract, Glaucoma, Accidents, Diabetes and some other diseases of the eye.

The Greek definition of blindness says that "Blind is every person who doesn't have a light perception or his/her vision is less than 1/20, than the normal vision". In Greece we have only two special primary schools and the visually impaired children follow the normal education way, through High and University Schools. Throughout the years, there have been efforts for the visually disabled people's welfare. The Panhellenic Association of the Blind is our National Organisation which has a very active role concerning blind people's rights.

It is a member of Blind's Europe Union and it's very important to be said that it has been administered all these years from blind and partially sighted people.

In this point without dealing deep into the historical background of the visually impaired persons in Greece, I would like to notice that all the rights the visually impaired people have achieved in Education working area and Social life has been due to continuous struggle and fights.

In Greece, the visually impaired people, as they use to say, don't ask for special treatment. They only ask the opportunity to start their lives from the same starting point from where the rest people start.

No I would like to give you a brief outline of the development, the current situation and the prospectives of the field of Orientation and Mobility activities in Greece.

"Independent Living of the Blind", is a new term in the Greek reality, and is also the title of the so called Horizon program undertaken by the Panhellenic Association of the Blind.

This project realised in Denmark and Greece in the period 1992/93 aimed at the education of sighted people who would be the <u>first</u> Mobility and Daily Living Skills Instructors for the visually impaired people in Greece and who

would offer them in this way the basic means for social independence. Until now, in Greece there were and are two main Mobility systems:

1) The self taught method, which consists of doing it by yourself, and
2) One sighted guide system, which is the most simple and unexpensive way of getting around.

But something changed and the mobility story has started in Greece, two years ago with the program "Independent Living of the Blind".

Six Greek graduates of humanistic University schools were chosen to participate in this program.

The educational period had three phases. The most important one took place in Denmark, in the Institute for Blind and Partially Sighted people and it was both theoretical and practical under blindfolds.

The third and last phase took place in Athens last year, 1993, and through the lessons we gave to our clients we had to apply to practice and the most important to adopt the danish model to Greek conditions. And believe me it was the most difficult area to deal with.

We had in a way to create the greek model of training visually impaired people in O & M and Daily Living Skills.

Also we realised more and more the need for the existence of a permanent, wholly fitted institute where part of the mobility lessons would take place.

Our principle aim today is to create a really working system of social rehabilitation services for anyone who need our help.

We also want to start training other sighted people as Mobility Instructors and our goal is to establish O & M centres all over the Country.

Finally, we want the O & M lesson to be a part of the ordinary schedule for the visually impaired children in their school area.

Research and a lot of projects has to be carried out and we give a great effort in order to inform people about our work.

We already have made our first step. I'm the alive proof for that!

I strongly believe that this Conference could be, and I'm sure will give to Greece, a very good starting point concerning our International participation and co-operation with the professional Association of the Mobility Instructors.

Because this kind of exchange of experiences and information in matters of training people with visual disabilities among professional groups, services and organisations of different countries consists a crucial factor in the development and improvement of our future.

O & M TRAINING FOR THE MULTI-HANDICAPPED IN HONG KONG

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Background

The no. of blind children in Hong Kong have decreased during the past ten years, therefore one of the schools for the blind - Cannossa School for the blind - was closed in 1988 and students were transferred to our school.

Our school - Pokfulam Training Centre was established in 1978 - Now this is the only school for blind & multiply handicapped children in Hong Kong.

In 1992/93, the training program had two mobility instructors and 50 students.

Statistic on student's handicaps (1992/93)

Handicaps	No. of students
Totally blind with severe retardation	4
Totally blind with moderate retardation	30
Totally blind with mild retardation	4
Partially sighted with moderate retardation	12
Total	50

Some of our students have additional handicaps apart from the above handicaps such as Spastic Hemiplagia, Epilepsy and emotional disturbances.

Training Program

Each student has to go through a evaluation test before participating in the training. The test is designed to evaluate student's developmental levels in the areas of motor, cognitive and sensory skills.

An effective intervention program is always based on the careful assessment of the student's abilities. The training program is highly individualized.

The content of the training program is divided into four stages: (1) severe grade
(2) moderate grade
(3) mild grade
(4) outdoor mobility training

(1) Severe grade includes posture and gait, fine body-movements, body awareness, recognizing the classroom, school layout and to negotiate steps unaided. The aim of this stage is to develop the student's confidence and concentration with regards to the above, so they will show interest to explore their surroundings.

We use many games and toys to enlarge the student's knowledge of their environment and teach them about body image and movement.

This stage is a readiness program. We're getting students ready for future independent travel by focusing on their developmental process.

Class teachers and Physical Education teachers reinforce the training program in their lessons in order to maximum student's potential in mobility skills.

(2) Moderate grade includes all the above with the addition of basic concept development, spatial concept development, sensory training, sighted-guide technique, self-protection technique, pre-cane skill, travelling between two point, environmental awareness. The aim of this stage is to train students that when walking they have the knowledge of their surroundings and how to care for themselves and others. Moreover, they feel that they can venture outside the school unattended to explore what the real world is all about.

(3) Mild grade includes all the above with the addition of advanced concept development, the use of the cane both within and outside the school. This is taught in two stages:

i) Basic cane skills inside the school layout.

ii) Independently use of the cane both inside and outside the school, this is to increase their confidence to the changing layout of Hong Kong.

The aim of this stage is to teach students to be relaxed in all situation and walk proudly wherever their hearts desire to go.

(4) Outdoor mobility training, this stage is only for moderate grade and mild grade. The aim is to familiarize the student with the transport systems in Hong Kong, the correct use of social graces and how one pays for different modes of transport.

Every stage is carefully designed to suit the individual student's needs and to bring out his/her strengths and minimising his/her weakness. The training is broken down into a series of smaller stages, each stage is broken into a series of steps, so they can benefit from systematic instruction in mobility.

Although our students need plenty of practice, they show improvement after the training. Hence their continuing interest and inclusiveness to learn new things.

Conclusion

The orientation and mobility program is a team effort. Parents, residential-care staff and teachers are all working together. Students are taught ways of determining their location environment and how to move efficiently in these environments.

There must be a carry-over of this learning after school hours and in the holidays in order to establish lasting concepts in the students mind. This is done by residential-care staff of the boarding school to reinforce student's learning after school hours. Some forty students are living-in from Monday to Friday, then parents will be reviewing the training program at home. We hold regular training sessions for over staff and parents so they have a general idea of training program.

We always encourage students to learn, to listen, to ask, to touch, to explore and so on, so they can become familiar with the world around them. The more they know, the more secure they feel and the more willingly they are to become a valuable member of our society.

As a mobility instructor for the past ten years, I have found my work to be very rewarding and challenging.

- THE END -

INTRODUCTION, CURRENT SITUATION AND STRATEGIES OF ORIENTATION AND MOBILITY SKILLS ON CHINA'S MAINLAND

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1. Introduction

Orientation and mobility (O & M) skills are one of the most essential conditions for the blind to rely on and to support themselves in society. The Chinese blind people, in order to wrestle with their destiny, have kept seeking most available ways to walk even since ancient times. Mr. Mao Lianyun in Taiwan in his book "Blind Children's Orientation and Mobility" (1973) pointed out: "In a Chinese scroll painting of the 13th century and a Japanese painting, there appeared a dog-guided blind man." We consulted many ancient paintings in Najing History Museum and Museum of Chinese History. In the "Group Blind People Picture" of the Song Dynasty (some 1000 years ago) and the "Royal Capital Scenic Spots Picture" Reflecting a scene of prosperity of Jinling (today's Nanjing) in Ming Dynasty (about 600 years age), we also found blind people walking with a sighted-guide or a bamboo stick or a guide dog. In fact, the history of blind people's attempt to use various guiding aids and skills might be traced back to more remote past, especially for a civilised country with a long history like China.

But in history, just like those of many other countries, Chinese blind people were in the circumstances of being looked down upon. Their spontaneously developed experience of orientation and mobility has never and impossibly been summed up and researched earnestly. Scientific orientation and mobility skills research and training for the blind are social progress of the 20 century. O & M skills originated from Germany and France after World War 1; later, they developed in America and Australia.

From 1960's to 1970's they were introduced into some Southeast Asian countries such as Malaysia, Vietnam, India and Indonesia; the skills were not introduced into China's mainland. They might have been helped earlier by the international society, but introduction of the scientific O & M skills to China was about 10 or 20 years later than that to the Southeast Asian countries. The reason for this is related to China's historical background of the cultural revolution and the closed-door policies of that time.

Up to the end of 1980's, with the determination of China's reform and open-door policy, and increasingly international communications, world-advanced ideas of special education, technology, skills and even laws began coming to China's Mainland, such as Public Law 94-142 of America, mainstreaming education, the ideas for the handicapped to become rehabilitate and to return to the society. All these have widened view of the mainland workers for the blind. With changed mind, they start to examine their traditional methods for the blind, which are still in different closed degree. Now they have realised that O & M skills, though neglected by them for long, are the most urgent needs of enabling blind people to step out of their own life field and towards the big family of society.

The Amity Foundation which was created on the initiative of Chinese Christians, Golden Key Research Centre for the Blind Children Education, and Christoffel Blindmission (CBM) have been making great contributions to the spread of O * M skills for the blind on the mainland. They organised foreign experts to spread these skills in China by importing skills, making video films and educational and propaganda materials, etc.

In the autumn of 1988, Dr.s.e.bourgeault, CBM Special Education Consultant, was invited to Nanjing, for the first time introducing O & M knowledge and skills to the mainland people. He trained for the mainland a first group of Instructors for the blind people with O & M knowledge and skills, indicating the beginning of scientific O & M introduction to the mainland. This is a milestone in the mainland blind education history.

In the summers of 1989 and 1990, Australia O & M specialist Dr. Tom Blair, twice invited to China successively at the training classes in Beijing and Shijiazhaung, instructed various guide skills except dog-guide skill, giving his Chinese students longer strict training, including on-the-spot practice such as walking in the streets, on the village paths and on the narrow bridges. Besides, Dr. Tom Blair taught them the making of embossed and relief maps. Those were the earliest professional O & M Instructor training courses held on the mainland. As a result of Dr. Tom Blair's twice visits to China, hundreds of Chinese teachers were trained and comparatively widespread and profound influence was left.

Additionally, some other organisations and experts made, are still making direct or indirect contributions to the cause of spreading O & M skills for the blind on the mainland, for instance, Karter Foundation, Hong Kong Society for the Blind, China Federation of the Handicapped, United Nations Children's Foundation, and the specialists they invited to China.

At the same time of the foreign specialists' working in China, some O & M popular literature, video-visual materials and translated materials from Taiwan or the mainland appeared one after another. And Nanjing Normal School for Special Education is the first to list O & M training into her required courses. Mr.Xu Bailun's book "Teaching Guide to Integrated Education for the Visually Handicapped Children", in which there is one chapter specially arranged to introduce basic O & M skills, serves as a primer of the mainland teachers for visually handicapped children.

In the summer of 1992, with Mr. Xu Bailun as the producer and Mr. Zhou Maiode as the screenwriter-director, the 70 minute video film "Orientation and Mobility for the Blind" was shown on TV. It is accepted not only by the sighted but by the blind. The influence of the film is beyond schoolbook and classroom instruction and in October of 1992, this teaching film won a prize in the third national TV teaching program appraisement.

In the autumn of 1992, sponsored by Hong Kong Society for the Blind, 300 copies of the video film were duplicated and donated to each of the schools for the blind and to the federations of the handicapped at different levels.
This donation is given impetus to spreading O & M skills in the vast rural areas and outlaying districts on China's mainland.

2. Current Situation

In pace with the introduction of O & M skills to China's mainland, the Chinese blind people, especially the young boys and girls of the schools for the blind, are getting to know them well. According to our investigation on five schools for the blind separately located in Jiangsu, Zhejiang, Shandong and Jiangxi provinces, the O & M trained blind pupils number 50.9 percent of the total. Although nearly half of the total have not been trained to learn the skills, yet all the untrained pupils expressed their common urgent need to receive the training. This is an extremely favourable condition, under which we can popularise O & M skills in all mainland schools for the blind. (see Table 1.)

Table 1. Current situation of O & M Training in 5 Schools.

Trained or untrained	pupil number	%
Total of the surveyed pupils	51	
Trained	26	50.9
Trained, but to be more skilful	15	57.6 (of the trained)
Untrained	25	49
Untrained, but want to be trained	25	100 (of the untrained)

The courses offered for all the Full-time Schools for the Blind, which has been carrying out since the autumn of 1993, expressly stipulates that O & M training is a required course for the Blind pupils.

But from our investigation we found some existing problems as follows: (1) Shortage of teachers, especially special O & M Instructors, and even none in certain schools; (2) lack of individual instructing, systematic training, on-the-spot exercises and qualified and skilful Instructors.

Most blind pupils can practise orientating and walking only within the campus, and consequently, they are beset with difficulties when they leave school, and (3) was of a kind of O & M textbook suitable for the blind pupils.

I is more difficult to popularise O & M skills in the blind adults that in the blind youngsters on China's mainland. This is due to: (1) The blind adults generally do not have a strong desire to move to be trained; (2) No guarantee is given for training-time; (3) Leaders or managers ignore the training of this kind. In Nanjing and Changsha, we surveyed 46 blind adults at their posts. Almost 100 percent of them did not receive O & M training, and only one of them learned a little about sighted guide skills at the time when he was playing a role in the above mentioned TV teaching film. Of the 46, only 17.7 percent wanted to be trained. Two reasons can account for this - one is subjective, another is objective. Subjectively, in some of the blind adults, O & M is thought suitable to the blind people abroad, not acceptable in China, and useless even if learned.

Some others, however, are not interested on O & M training at all, for they are reaching retiring age, they will live in retirement at home. Objectively, Chinese blind adults at their posts usually do some simple jobs that consume certain strength, but they have also have their fixed production quota to fulfil each day. If they are given O & M training after eight-hours' work, they would not like to receive, because of fatigue or a lot of household duties. If the training is arranged in the working hours, the blind workers may worry about their production quota completement. In view of this, their attitude towards O & M training is not active enough. (see Table 2)

Table 2. O & M Training of he Investigated Adult Blind Workers

Trained or untrained	Blind adult number	%
Total	46	
Trained	(learned a little sighted guide skill)	2.1
Untrained	45	97.8
Untrained, but wanted to be trained	8	17.7

Such a low rate of popularising O & M skills among the blind adults is mainly due to their managers' unchanged sense. The managers have not fully realised the importance for a blind person to master O & M skills. Some of them worry about that the factory's economic benefits will be reduced when the blind workers are sent to receive O & M training; some believe that blind people can naturally learn to walk instead of being trained; some even doubt : "is it necessary to spend so much time in practising walking?"

The following are some generally existing prominent problems about the mainland blind people's walking: (1) Incorrect way to use a cane. Quite a few blind people are used to using their irregular "one point touch" method when walking in the street. As a result, they can't ensure that each point of step-fall is explored before making a step, and often such dangers as holes, bricks, stones and parking vehicles can not be promptly found, very likely causing injuries by stepping on nothing or stumbling. One winter night in shanghai, a blind man fell into an open sewer well in a street and was not rescued until dawn broke. It happens now and then that a blind person pokes his stick into another person's bicycle wheel. To avoid being noticed by others, some blind people prefer not use a cane even on unfamiliar road, for fear that it would be looked upon as a symbol of the blind. Consequently, they must be more danger. Table 3 shows that of the blind person investigated in Nanjing, Nanchang and Beijing, only 5.2 percent adopted the "two point touch" method.

Table 3. Cane Usage in Nanjing, Nanchang and Beijing.

Investigated blind person number	57	%
Two point touch	3	5.2
One point touch	36	63.1
Upholding	1	1.7
Holding cane head free from ground	1	1.7
Not using cane	8	14
Relying on another person to lead way	8	14

(2) General existence of peculiar walking manners (shrinking, shrugging, head-hanging-down, stooping, hunchback and walking-forward-sideways) and lack of self-confidence for walking. In the cities of China's mainland, blind people may not feel safe while walking on sidewalk, because usually there are many walking people and parking bicycles there. To avoid being hit and go a little faster, sometimes blind people prefer to walk on a slow-traffic lane or along a railing of a fast-traffic lane, nevertheless, their sense of unsafety thus increases. of the 16 blind adults we investigated, 14 with obvious peculiar walking manners, about 87.5 percent of the total (see table 4). Lacking security sense and self-confidence is one of the reasons for the blind mainlanders' peculiar manners.

Table 4 Nanjing Blind People's Habits of Street-walking.

Number of the Investigated People	16	%
On Sidewalk	3	18.7
On Slow Traffic Lane	6	37.5
Along railing of fast-traffic lane	3	18.7
With sense of unsafety	9	51.2
With distinct peculiar walking manners	14	87.5

(3) Weak capability of self-safeguarding and low degree of safe walking. On our investigation into the safe-walking problems of the blind people in Nanjing, Nanchang, Beijing and Shanghai, only 45.2 percent of them were not injured by obvious accidents, as shown in Table 5.

Table 5 Investigation on Safe-walking problems of the blind in Nanjing, etc.

Number of people investigated	42	%
Not injured by obvious accidents	19	45.2
Slightly injured by stumbling or stepping on nothing	36(person-time)	
Fell into sewer well	1	
Fell into pool	1	
Fell down from up-stairs	1	
Fracture by car accidents	2	
Death from car accident	1	54.7

3. Great Responsibility

Scientific O & M skills were introduced to China's Mainland, but they only have a 5 years' history and are still in the primary stage. As has been shown in Table 1, 50.9% of the blind pupils on the Mainland received O & M training, but this percentage refers only to the condition of the urban schools for the blind. As to the vast rural areas, the number of the O & M trained blind pupils who are mainstreamed into village regular classes in perhaps quite small. Furthermore, the enrolment rate of the Mainland blind children aged 6 to 14 (not including low vision children) is only 3.8% (see Note 1), to say nothing of giving O & M training to most of the school-age blind children remaining outside schools.

O & M training of thousands of Mainland blind adults have not really been placed on the authorities' agenda. According to the 1987's national sampling survey on the handicapped, the mainland visually handicapped people totalled about 7,550,000, of whom 6,350,000 were over 15.

It is the mainlander's arduous task and a striking problem to popularise O & M skills in such a big population of the visually handicapped, which is even bigger than the entire population of some north European countries.

O & M skills of the blind are not only related to their daily living abilities, but also to their employment, economic self-support, marriage, return to the society, and so on. The employment rate of the mainland handicapped people aged 15-59, is separately about 50% in the cities and 60% in the rural areas. The percentage of the self-supported handicapped people is only 30.2% to the total number of the mainland handicapped people (Note 3), that is to say, most of them are unable to be self-supported. Of the visually handicapped persons over the age of 15, 37.87% (about 2,400,000 people) Lost their ability to labour, which is the highest percentage compared with those of the mainland labour-ability-lost population of various handicapped types (Note 4). Actually, the lack of ability to walk independently and freely disqualified many of the visually handicapped persons from obtaining employment.

Table 6 Labour Ability Loss of the Various Handicapped Persons Aged over 15.

Handicapped type	% of the labour-ability-lost persons to the same type of the handicapped
Visually handicapped	37.87
Hearing handicapped	20.02
Mentally Handicapped	9.58
Physically handicapped	31.81
handicapped due to mental illness	37.08

Mainland handicapped people meet with more and more marriages reverses than those of the persons in good mental and physical health (note 5). This is directly related to their abilities to take care of themselves, to move independently, and to adapt the society.

Table 7 Martial Status Comparison between the Handicapped People and Sound Persons

Type	Having a Spouse	Spouse bereft	Divorced
Sound persons	91.8%	7.6%	0.55%
Handicapped	66.37%	32.17%	1.46%

There are about 2,998,000 Visually Handicapped persons over the age of 60 on he Mainland (Note 6). With economic development and improvement of medical and material conditions, the number of long-lived people will increase remarkably in the 21st century. To meet the increasingly numerous special needs of these old visually handicapped people, to improve and retain their ability to move, is not only a problem of making them beneficial to he society, to their personal and family happiness, but also a sign of the social civilisation. With this goal, the Mainland workers for the visually handicapped are shouldering heavy responsibilities.

4. Strategies

In our opinion, to popularise O & M skills on te mainland, the following strategies must be taken:

(1) To establish a national organ and nation-wide network for O & M skills training and researches. At such a tiny place of Hong Kong, there is a special organisation Hong Kong Society for the Blind in charge of these affairs, whereas on the Mainland with 7,550,000 visually handicapped people living, it is essential to set up an organised system for this purpose. The branches of the organ and network can be affiliated to the Associations of the Blind under the federations of the handicapped at different levels, because it proves quite true that blind people can manage to handle their affairs effectively by themselves. This organ and network should be closely cooperated with the nation-wide system of special education and civil administration for the great cause for the blind. In this way,m a comprehensive and unified program can be made on the training of the blind adults at their posts, of the blind pupils at school and other blind people in society (including the blind children not at school).

(2) To obtain non governmental financial aid, governmental financial allocation and foreign aid and to set up a foundation for raising funds. The raised funds will be used to print publicity materials and teaching materials, to buy appliances, to train teachers, to give awards to those teachers who make remarkable achievements in O & M training, and financially to aid impoverished blind people and school-age blind children in O & M Training necessities, such as canes, vision aids, etc. On the Mainland, only a small proportion of visually handicapped children have vision aids (see Table 8 and note 7). Most visually handicapped children's families are lower income families. So it is necessary to give them some financial help.

Table 8 Application of Various Appliances in Visually Handicapped Children Aged 0 - 14

Total of Children	Vision aid	Lead Blindness Appliance	Other Appliances	No Appliances
390	10	7	4	369
%	2.5	1.7	1.02	94.6

(3) To combine popularisation of O & M training with improvement of Instructor's quality. The Instructor shortage problem must be solved by constantly holding O & M Instructor training classes to train a professional contingent devoted to the cause for the Blind, and this contingent must be skilful and qualified, must know how to train the visually handicapped. Meanwhile, frequent teaching and research activities should be developed to make further improvement on the teaching quality. We must not neglect the improvement while the popularisation. And the popularisation will certainly be promoted through the improvement.

(4) The low-vision people also need to be trained in O & M skills, but they can make a quicker progress in learning the skills than the blind; more important, they are more likely than the sighted to experience the difficulties and to look into the problems in walking. Our experience has proved it practical to train blind people, which is also a good way to make up for the teacher shortage and to improve the training quality.

(5) Pupils in te schools for the blind are more readily receptive to new things than adults. Pupils' time for learning and training is ensured. Therefore, to start training from school times, is an effective measure to thoroughly change the present situation of Mainland blind people live scattered in villages.

(6) Most Mainland blind people live scattered in villages and townships (see table 9 and note 8). Comparatively speaking, urban blind people are concentrated (many blind persons' working at the same factory is such an example), and their educational level is somewhat higher than that of the rural blind population. In light of this, our general plan for the step-by-step popularisation of O & M Skills should be: Cities first, Town-ships second and Villages third. But we can also carry out the plan simultaneously both in the cities and villages, if possible. Our cardinal aim is to serve all the visually handicapped people. We should go to offer our care and training service to those scattered or rural or old visually handicapped people.

Table 9 Distribution of Visually Handicapped Children in Cities, Townships and Countryside

Total of the surveyed children	In Cities	In Townships	In Countryside
390	19	66	305
%	4.8	16.9	78.2

(7) There are several kinds of Mainland-made canes available to the blind, but their colour codes are not uniform and some canes are easy to be broken. Besides, most blind people are still using a bamboo, or wooden or iron stick (see Table 10), though they are neither suitable nor seemly to use. Improvement should be made in durability, lightness, folding function, conductibility, colour code uniformity, etc. If a cane is made into a combination of slipping-prof, lighting, warming, health care and message functions, it will be welcomed by visually handicapped people.

Table 10 Various Canes Used in Nanjing, Nanchang, etc.

Total of the blind	Cane	Bamboo or wooden stick	Iron stick Iron pipe	No stick used or relying on others for help
67	10	30	12	15
%	14.9	44.7	17.9	22.3

(8) Keeping dogs in cities is a social problem. On China's populous Mainland, dogs are generally forbidden to keep in the cities. So the matter whether or not Mainland urban blind people can use guide dogs remains to be studied. In accordance with our investigation on the blind people in Nanjing, some of them, especially blind young men, are still very fond of dogs. They kept dogs as their companions and guides before, but their attempts ended up by selecting unsatisfactory dog strains and not having special training for their dogs.

People usually believe that German Shepherds are chosen as guide dogs of very good strain. Now we have been told that Kunming Dogs (produced in Kunming, capital city of Yannan province of China's Mainland) were also apprised in 1988 as dogs of very good breed, even superior to German Shepherds in identification, tracing, searching, antibacterial immunity, reproduction ability and loyalty to people.

So we think it is possible to establish an experimental base for training Kunming Dogs in China's province. In recent years, some "pet hospitals" appeared on the Mainland. These hospitals can provide special vaccines for dogs, a series of feed, implements and materials, thus giving blind people necessities to keep dogs.

In the vast rural areas of the Mainland, keeping dogs is generally not forbidden. With the improvement of the economic conditions, it is quite possible for rural well-to-do blind people to buy, to keep and use guide dogs. So pilot projects on dog guide skills can be launched in some selected villages.

(9) Training courses should be held to train the leaders,officials and workers of the federations of the handicapped, civil administration organs, welfare homes, factories for the blind, school for the blind, for changing their sense and raising their level of understanding the cause for the visually handicapped. This is a very essential key move to push forward the development of the O & M skill training for the mainland blind people.

Note:

(1) - (6) Ding Qiwen, et al: Chinese Handicapped People, Hauxia Publishing House, 1990, P3 - 8

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A SYSTEM TO OPTIMIZE REHABILITATION RESULTS: TUTORS

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In addition to a sensory handicap, blindness and visual impairment entail a significant psychological and social change for the individual and the people with whom he is associated. Adjustment to this new situation, which involves new limitations and circumstances, requires that an individual adjust to the new reality facing him in order to lead an independent life.

After six years of offering rehabilitation programs, the topic which concerns us most is not how to obtain better results during a subject's training in independent living, but how to ensure that what is learned is actually used once the program comes to an end, since techniques and skills learned are often not applied in daily life. Given this reality, we set out to improve our students' results and have seen an increase in their use of the skills in daily life after the psychological support - as opposed to direct support - of knowing that the mobility instructor is nearby is no longer present.

TUTORING PROGRAM

Our program involves the participation of an already rehabilitated individual who serves as a tutor in the rehabilitation process of another. The experience of a blind or visually-impaired tutor who has received additional training in order to teach others can be a point of reference for the recently rehabilitated individual who must put what he has learned into practice in his daily life.

The program is directed at blind and visually-impaired individuals who are completing a rehabilitation program, or members of their families, who voluntarily request to take part in it.
The team will determine whether it is recommendable for each case and the best time to carry it out.
The team is composed of:
1. The center's rehabilitation team.
2. A group of visually-impaired or totally blind individuals with experience who participate as tutors.

Tutor selection process:
- Already rehabilitated individuals are selected to become tutors.
- They must have the same deficiency as the person to be tutored (total blindness or visual impairment).
- An average level of education.
- They must have adjusted well psychologically and in terms of technique to their deficiency; they must be independent enough to use public transportation in traveling in complex areas with which they may or may not be familiar.
- An optimum level of socialization and adjustment to the environment with a realistic and optimistic view of the situation.
- They must be committed to carrying out the job assigned. (by means of a written agreement)
- They must receive training from the rehabilitation team.

Program characteristics
1.- Selection of tutors (according to the criteria mentioned above).
2.- Training of tutors.
On such topics as:
- Planning of tasks for the day's session.
- Relationship between tutor/individual going through rehabilitation.
- Relationship with the public.
- Instruction in skills, reinforcement systems.
3.- Execution of the tutoring program: tutoring sessions last at least two hours, depending on the

task to be completed, for a duration of one to three months per case.
4.- Evaluation.- Of the results obtained and a comparison with the results from the rehabilitation period.

Tutoring objectives

Training in orientation and mobility is normally carried out by the mobility instructor, while the tutor is introduced during the last few days of the program. The tutor immerses himself in the student's daily life a few hours per day in order to:
- Practice indoor and outdoor mobility.
- Intervene with the family of the individual going through rehabilitation - who have previously been prepared - by showing them how a blind person functions on his own so that their confidence in the student's possibilities for independence increases.
- Adapt his physical environment - adjustments to his material environment, etc.
- Free time.
- Help the student overcome the difficulties associated with independent mobility and confrontation of society using a white cane.
- Cover aspects which the instructor overlooked because situations did not come up.
- Increase the student's motivation and interest in the continued use of skills through trust and commitment between both individuals involved.
- The tutor is in charge of directly following up on application of what has been learned in real life situations and in new daily living situations.

- At the same time, the tutor obtains an increased level of independence while being motivated to excel on a continued basis.

The results obtained for this program are positive and serve as a reinforcement to help students continue using and developing what they have learned while making it more useful.

BLINDNESS ASSOCIATED WITH BILATERAL HAND-AMPUTATION

Mº Victoria Diaz, Paloma Matador

Primary Rehabilitation Specialist, Occupational Therapist at the "Ignacio de Satrustegui" Centre, O.N.C.E. Apdo. 468, Sabadell, BARCELONA.

José Luciano Perdomo, age 43, presents blindness associated with bilateral amputation of the upper extremities, that is, his right arm at wrist level and his left at the third distal forearm level, as the result of multiple traumatisms in May 1986. Between June 1990 and January 1991 a mechanical prothesis with dorsal movement, MUSTER type, was fitted to his right arm.

On 30 September 1991 my first contact with him and with his wife, an indispensable participant during the initial phase due to the large degree of dependence José displayed, takes place. It was not until two days later that we begin working on mobility inside the Rehabilitation Centre.

During the first three weeks we work on the following collaterally:

- Development of direct haptic perception through the stumps.
- Instruction in the use of the prothesis, in order to incorporate it in his corporal system.
- Auditory system training, touching on all the sensorial aspects of hearing.
- Indoor Orientation and Mobility instruction.
- Work on solutions to his basic needs hygiene, personal care and meals, with the direct collaboration of the occupational therapist.

After having consulted the orthopedist and the physiotherapist, we decide to use the prothesis with a hook shaped clamp from the third week on.

Attempts to use the cane are very positive; therefore, we begin adapting a rigid fiberglass cane with a plastic handle to the clamp. We also begin to work on a way to adapt silverware to it and incorporate it in the corporal scheme and spatial control of the prothesis as well as the clamp.

It is at the beginning of the sixth week that we begin training with the cane , following the same steps, but in a slower manner than with a person who is only blind.

We progress steadily in the Orientation and Mobility programme as well as in Daily Living Abilities. For this reason the team decides to exclude the wife as a collaborator.

From the fourteenth week on, the programme of Daily Living Abilities is extended. We also see the need for instruction in some system of communication, Talking Book or Spoken Braille, in which optimum results are obtained.

I shall now go on to describe the programme in Orientation and Mobility and Daily Living Abilities completed by José in a period of approximately 22 weeks with sessions that varied between 70 and 80 minutes in length:

ORIENTATION AND MOBILITY PROGRAMME

1.- Pre-requisites to formal Orientation and Mobility instruction:

- Development of perceptive systems.
- Development of gross and fine motor skills (use of prothesis).
- Knowledge and use of relaxation techniques.

2.- Formal Orientation and Mobility instruction:

2.1. O and M indoors:

- Trailing.
- Self Defense techniques.

- Sighted guide techniques.
- Establishing points of references and creating spatial images.
- Cane techniques, adapted to the type of handle and to individual physical characteristics.

2.2. O and M in quiet residential areas:
- Simple L or C shaped routes.
- Geometric shaped routes.
- From one point to another.
- Simple with goals.
- With help from people.
- Use of transportation with a guide (train, taxi).

2.3. O and M in advanced residential areas:
- Execution of routes from one point to another.
- In pedestrian areas.
- With an occasional guide.
- In commercial areas.
- Use of transportation with a guide (train, taxi).

<u>DAILY LIVING ABILITIES PROGRAMME</u>

1.- Hygiene:
- Showering.
- Using the toilet.
- Shaving.
- Combing hair.
- Brushing teeth.

2.- Arranging clothes:
- Identifying clothes and shoes.
- Putting on clothes properly.
- Using hangers and placement in wardrobe.
- Cleaning shoes.

3.- Training in table skills:
- Based on placement and use of silverware with independence and on searching for and locating food (previously cut).

4.- The home:
- Making the bed.
- Lighting a gas burner and centering pot on it.
- Using a coffee grinder and an Italian coffee pot.
- Using a milk heater.

5. Using everyday objects:
- Taking a key and putting it in a lock.
- Using plugs and sockets.
- Using dial and push button telephones.
- Recognizing money (notes).

6.- Using specific objects:
- Using a talking wristwatch.
- Using a liquid level detecting device.

It has been possible to carry out the rehabilitation programme thanks to José Perdomo's fine capacity and disposition, as this was the first case that we treated with these characteristics. The physical space where this was carried out is a Rehabilitation Centre which spans a surface of 9,500 square metres, of which more than 2,500 are built on. The main part of the building is composed of a first floor at ground level covering some 2,300 square metres. It contains classrooms, specific rehabilitation areas, work and team meeting areas, director's and administrative offices. The second floor covering some 900 square metres basically contains sleeping quarters; and, the third floor contains two complete apartments that are used for instruction in Daily Living Abilities.

In order to attain our final objectives, we have received the collaboration of personel from the following specialities:

A Physical Therapist, an Orthopedist, a Psychologist, a Social Worker, a Technology Instructor, an Occupational Therapist, and a Primary Rehabilitation Specialist.

BRINGING OUT THE CREATIVE POTENTIAL:
- A COMPLEMENTARY TEACHING APPROACH TO
THE ORIENTATION AND MOBILITY
CURRICULUM

Magda Buchholz

Royal New Zealand Foundation for the Blind
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Having taught orientation and mobility for 18 years I found that my teaching approach has changed over the years through developing a greater awareness of the individual creative potential in my clients and myself.

The most prominent change has happened after I graduated as a participant of the "First International Exchange Program" at the Carroll Centre for the Blind in Boston, USA, in 1988. During my stay in this program I was introduced to foil fencing as part of a comprehensive rehabilitation program for clients with vision impairment and blindness, and took part in a sensory integration program which was developed by Robert Amendola, a retired professor of art, who specalises in training in the use of imagination for visualisation. Both subjects, fencing and sensory integration have been an inspiration in my work until present.

My clients at the rehabilitation centre in Marburg/Germany took up the idea of fencing and in co-operation with the local fencing club they started this sport activity on a weekly basis.

Another break through of my professional development was initiated by one of my blind clients who wanted to become a dancer and was rejected by the local dance schools because of her vision impairent. I discovered an article about a dance research workshop in the British magazine "New Beacon" (Jan 89) advertising for a workshop called "Skipping Visual Impairment".

My client and I decided to travel to England and participate in this workshop which turned out to be an exciting challenge for both of us. We learned all about "contact improvisation" from Steve Paxton, an American

dancer and choreographer, who developed this form of dance and together with Anne Kilcoyne, a psychologist and theatre director from Dartington College of Arts explored into the possibilities of improving the movement possibilities of the vision impaired through "contact improvisation". Back in Germany I met another professional who taught "contact improvisation" to blind clients in the past and together with another of my O&M clients I participated in one of her workshops that included also motivity training on the trapeze which added a new movement quality.

The base of the dance workshops were breathing and relaxation exercises, massage and worming up exercises, which made me aware how crucial relaxation is to becoming creative and self-expressive with body movement, and I took up a course in how to teach meditative breathing and relaxation exercises.
I gained a certificate and started a relaxation class with my O&M clients in Germany.

When I came to New Zealand in 1990 I was determined to start all activities like fencing, contact improvisation dance, and other body awareness work in Christchurch. One of my clients was interested in Aikido, a Japanese marial art, and we both joined a club, which was most co-operative and really liked the challenge of teaching vision impaired students. And then I got involved with a "Feldenkrais" class which has become my new challenge in my explorations into movement possibilities, and a class titled "Limited Movers" which is run by Maggie Burke, a local dancer and choreographer for people with disabilities.
The latest projects are a dance and movement class for vision impaired children and a fencing class for the vision impaired members of the Foundation for the Blind.

Since I gained the knowledge and wider understanding of different qualities of movement and the use of imagination for visualisation I have integrated elements of it somehow in nearly each of my clients orientation and mobility program. I have come to the conclusion that my present teaching approach improves the motivation levels of my clients and enhances their lives by gaining a better qualitiy of living through greater enjoyment of moving through space or the environment.

I am going to describe briefly a few more details about some of the above mentioned movement classes and workshops:

FENCING	includes many important aspects of concept development like concepts of laterality , kinaesthetic awareness, body alignment and direction taking in space, co-ordination of movement and balance, use of tactual and auditory clues, and general body awareness.
CONTACT IMPROVI-SATION	is a playful, sportive and creative dance form in which dance partners improvise through body contact and weightsharing and development of kinesthetic awareness. It de-emphasises visual awareness and re-emphasises the kinesthetic sense as a basis movement in space. Movement arises through the sense of touch; each partner follows the other in 50/50 balance.
FELDENKRAIS	a therapy which creates body awareness through movement and can improve spatial awareness without the use of sight, improves posture and body alignment and brings on changes in body and mind by letting old habits go and therefore create new aspects of dealing with everyday life; also an excellent instrument for assessment and teaching of O&M. Feldenkrais, the founder of this therapy has developed a way to free people to be more creative intellectually and more flexible and flowing physically.

I have more background literature available for anyone who is interested and hope that there are other orientation and mobility instructors out there who want to take up the challenge and initiate creative dance workshops and movement classes. In case there are collegues around who also have experience with activities

like this, please, contact me and let me know about it. I appreciate any feedback I can get from you.

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TRAINING - A DIFFERENT DIRECTION

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THE COURSE

My introduction to Orientation and Mobility (O&M) was at the Louisiana Center for the Blind (LCB) in Ruston Louisiana. My curriculum involved four hours of travel, two hours of cooking and daily living skills, one hour of Braille and one hour of computers and keyboarding. The course was five days a week, over a three month period.

I was told three things by the director, about the course. That I would learn to live as a blind person, a person without sight, that I would cheat and that I would feel the emotions of a blind person. I was measured for a long cane and I mean a long cane...measured from the forehead, it was non-folding as if folding the cane was hiding the fact that you were blind. I was also issued with a sleepshade or blindfold. A major consideration was that I had to use the long cane even when I was sighted, it had to become a part of me.

My instructor for O&M was totally blind and this made me feel uneasy at first, but I soon began to have confidence with Arlene and felt quite relaxed full of trust in Arlene's ability to teach me. She would follow behind me , giving instructions, teaching me confidence, travel skills, how to problem solve and travel routes. As I became more proficient, Arlene would pull back on her support, until I was travelling independently and confidently. The most important words of wisdom that I received from Arlene were that confidence and problem solving were the two major considerations in O&M and independent travel.

Of course I did cheat over the course, used my sight to try and help, but only found more confusion, the moment I decided not to cheat was the moment that I really gained confidence and began to learn to travel without sight confidently.

To graduate I had to complete the following... three drop offs in Ruston, finding my way back to the center independently and travel to a City I had not been to before, finding my way to a shopping

centre and returning. Cooking and serving a three course meal for six people and for 40 people and being able to read and write grade two Braille using a slate and stylus.

I did manage to complete all the tasks required of me and I must admit that I felt as though I could live as a blind person, and live independently. My instructors gave me an excellent grounding for me to teach O&M, to understand the psycho/social side of being blind, to empathise with the people that I teach, and to encourage people to work towards independence. The cane had become a part of me and I felt awkward, lost and unsure without it, even when I was sighted!

GOING HOME

I returned home to Melbourne to begin my position as an O&M Instructor at the Royal Victorian Institute for the Blind (RVIB). I decided to ease in gently, understanding the philosophy of teaching O&M in Australia.

I have combined my training with experience and have discussed the training programs that other O&M instructors have been involved in. My training had some similarities, but what I missed was the theory, an important component. As a result, I am working to gain this knowledge. I also began to question a major part of my course, that you were blind or sighted, not in between.

My education training, specialising in physical education, and my seventeen years experience as a primary school teacher have covered aspects of human development and many areas of theory relevant to O&M teaching. This background has been helpful.

Orientation and mobility is based on one to one learning. It is a practical field, and I feel that my introduction to O&M has been extremely worthwhile, in spite of lacking in these areas.

ISSUES TO CONSIDER

There are several areas that I have questioned in the last few years relating to my training and that of others. They are issues that need to be addressed by Australians and others to better serve clients.

1. Can people who are blind be effective O&M instructors?

2. What percentages of time are needed for practical experience and theory, and is there benefit in intensive training?
3. What are the psycho/social issues related to O&M in an intensive course where a blindfold is used?

MY THOUGHTS ON THE ISSUES

Having thought about these issues, I would like to share my feelings.

I believe instructors who are blind or vision impaired have a definite place in the field of O&M. These instructors can provide, as a peer, trust, belief in each other's ability, insight, a natural instinct, and coping devises. A sighted instructor can be aware of these, but has not really experienced them fully.

It seems appropriate that instructors who are blind or vision impaired should work as part of a team with sighted instructors. This allows for visual checking of skills and provides for feedback on progress. Having access to both blind and sighted instructors has many advantages and has the potential to offer valuable perspective from each.

In regard to the balance between intensive training and theory, my philosophy has been that hands-on experience is the way to go. Reading provides one perspective. In experiencing it, understanding grows as does knowledge. At LCB, 90% of the course was practical, with 10% being theory. By experiencing blindness and living the emotions, I learnt to evaluate my feelings and live as a blind person. Would I have achieved as much if I had been given a book to read or references to locate? I doubt that very much.

Part of my job now as an O&M instructor is to talk to other professionals about O&M. A key to helping others understand vision loss is experiencing blindness. Blindfolds and simulated glasses help us tell the story. Theory is an essential part of the learning process, but needs to supplement the practical aspects.

For intensive training, I have generally found that confidence, motivation, and self esteem increase at a higher rate; there is instant feedback and success. Goal setting is better monitored and the goals are reached more quickly resulting in less completion time.

Part of my success to live as a blind person came from the intensity of my course. Regular practise and instructions cemented concepts.

While being under blindfold, numerous psycho/social issues arose within me. By completing my course in 3 months, I was challenged by my emotions to cope. I learnt to come out of a negative emotion into a positive one of self-esteem, motivation, liking who I am, accepting what has happened to me, realising my coping abilities, being realistic about my loss of sight, actually accepting that I was 'blind' whilst I was underneath the blindfold, and learning to change my ways to accommodate my blindness. I wanted to succeed, to be independent, and to live accordingly. This was important to me at the time of my training, and in retrospect, I achieved so much in such a short time. I think others could also benefit.

There is a downside to this type of training. The course did not include information about eye conditions, nor did it allow for individual differences. You were either sighted or blind; they did not recognise varying levels of vision impairment. This information is essential for individual instruction. Although my training was different than most programs, I am very pleased that this opportunity was available to me. It is training in an innovative, unique, intensive, and practical way - a different way.

CONCLUSION

Each O&M training program has its advantages and disadvantages. In addition, each has curriculum areas that are not adequately covered. As such, it is the responsibility of each person trained to evaluate the training options, matching his/her needs against what the program offers, and then once trained, finding opportunities to supplement other information given and adding to his/her knowledge base.

I will always be grateful to the staff and students of the Louisiana Centre for the Blind, and to David Blyth and Len Stevens from the Royal Victorian Institute for the Blind here in Melbourne, for my introduction to the world of blindness and .... to have had this training option available to me.

THE ATTITUDES OF FAMILY OR FRIENDS TOWARDS ORIENTATION AND MOBILITY TRAINING

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Abstract. This study examines the attitudes of family or friends towards a vision impaired person undertaking a mobility program. The aim is to measure the degree to which these attitudes impede or enhance a person's ability to learn mobility skills. A series of interviews with vision impaired people and their family or friends ascertained the value of family or friends playing a more active role in a training program. As a result, these findings demonstrate the importance of the participation of family or friends in the design of any mobility training program. Ths vision impaired person will, in turn, be given greater opportunity and encouragement to develop optimum mobility skills.

Introduction

I have been an Orientation and Mobility Instructor for the past ten years. In my experience, I have found the decision to accept and undertake O & M training can present a number of stressful factors for vision impaired people.

Just as the relationship between client and O & M instructor must be an honest and trusting one for a successful outcome, the same should follow for family members and O & M instructors.

This study examines the attitudes of family or friends towards a vision impaired person undertaking a mobility program. The aim is to measure the degree to which these attitudes impede or enhance a person's ability to learn mobility skills.

The Method we used for this study was as follows -
The sample consisted of 90 participants, 45 of whom were vision impaired, and the remaining 45 being either a family member or friend.

The subjects were clients of the Association for the Blind, Melbourne, Australia, who had been offered O & M training as part of their rehabilitation program. They had either refused, were currently undertaking or had completed training. Neither the subjects' age nor their degree of vision loss were criteria for exclusion from the study.

Data was gathered by two separate means. An interview using questionnaire 1 with vision impaired people was conducted by telephone. The vision impaired person was asked to nominate a family member or friend to whom a print copy of questionnaire 2 could be sent. The response to questionnaire 1 was 100%. The response rate to questionnaire 2 was very much lower - 28 responded from 45 questionnaires. However, as this survey was conducted by return mail, it is a high response rate from this type of collection method where subsequent mail outs were not carried out.

All the completed questionnaires were sent to Swinburne University of Technology, Centre for Urban & Social Research, Hawthorn, Victoria for data analysis.

This survey is an exploratory study, using a small sample. It is recognised that a much larger sample would be required to firmly establish indicators concerning both the vision impaired persons' and their family/friends attitudes towards mobility training.

Findings from Questionnaire 1

TABLE 1

Nominated Eye condition

Macular degeneration	18.2%
Glaucoma	11.4%
Cataract	13.6%
Diabetic retinopathy	11.4%
Other	45.4%
Total	100.0%

45.4% of the respondents fell into the category of 'other' which is somewhat surprising, as the four nominated eye conditions are the major causes of low vision in developed countries. Whilst recognising that some of the participants may have fallen into the category of 'other', this may suggest that a number of them did not have a clear understanding of the cause of their vision loss.

When asked from what source they first heard about O & M training, less than 25% said "from the medical profession", suggesting that the medical profession may not be fully informed about how to access O & M services.

The respondents were questioned about their initial feelings towards training. 60% reported being positive and enthusiastic. However, a significant number indicated that they were apprehensive.

Another interesting finding was that when problems arose in their training program, respondents favoured discussing these with one person in preference to talking about their difficulties in a group situation.

It is worth noting that 50% felt that their family member or friend was *over-protective.* The findings clearly indicated that family or friends were both encouraging and supportive, but at the same time, many were anxious.

The results of this question seem to indicate that although family or friends contribute to the vision impaired person feeling confident and capable, or both, a high level of *frustration* is evident.

Whilst it is evident from the responses that 48% are not embarrassed about their vision loss, 52% feel embarrassed some, or all of the time.

The majority of subjects said they were not self-conscious about using a white cane alone in the community.

These findings were consistent with the previous questions. Both responses suggested that there is still approximately 35% of subjects who have some level of self-consciousness about using a white cane.

The answers to this question clearly indicate that there is a need for more opportunity for the involvement of family or friends in an O & M training program.

70% of respondents felt that they would have benefited from the involvement of family or friends in a training program.

Findings from Questionnaire 2

Responses reflected a high concern by family or friends about the vision impaired person travelling alone.

As one may expect, findings showed that the majority of respondents were protective.

They also reported a degree of frustration when travelling with a vision impaired person in a crowded or an unfamiliar environment.

88% of family or friends were positive or enthusiastic towards the vision impaired person undertaking an O & M program.

When asked if they felt embarrassed if the vision impaired person was using a white cane, the findings showed most were not embarrassed and indeed comfortable.

There were similar findings which showed that family or friends also felt quite comfortable in a social situation, such as a restaurant.

A high percentage reported experiencing emotional and/or practical problems when travelling together. It is interesting to see that 22% had difficulty all of the time.

Only 32% reported having learned sighted guide skills. All these respondents indicated that it was useful. However, the majority of the remainder indicated their willingness to learn these skills.

Although 40% reported problems accepting the family member's vision loss, 89% indicated that they would encourage independence and 65% indicated that they would be willing to participate in an O & M program.

This shows the importance of designing group or individual mobility programs that include family or friends. This will assist in providing positive and encouraging attitudes to orientation and mobility training.

Conclusions

This exploratory study found that the majority of family members or friends had positive and encouraging attitudes towards orientation and mobility training. However, their lack of direct involvement in such a program may reduce the development of optimum mobility skills by the vision impaired person.

Allan Dodds, in his recent publication 'Rehabilitating Blind and Visually Impaired People' states "it must be recognized that people generally live their lives in the company of other people with whom they share their daily hopes and fears. Any attempt to restore a person's independence without the recognition that your attempts may produce the need for change in other members of the family is likely to be less than optimally successful".

As a result of the present study, discussion groups exploring attitudes of family members and friends are being incorporated into the program of orientation and mobility service delivery. The outcomes of these groups will be monitored, and modifications to the sessions will be made as necessary.

The direction of encouraging the involvement of family or friends in orientation and mobility programs is becoming an integral part of orientation and mobility training at the Association for the Blind.

References

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Vocationally oriented rehabilitation of the visually handicapped in Sweden

The aim of Ami-Syd (The Employability Institute for the Disabled) in the south of Sweden is to enable the visually handicapped to find and retain employment.

The institute has existed for more than 20 years and we have long experience of rehabilitation work.

We have resources to help people with different types and degrees of visual disabilities - the blind and the visually impaired.

In our work we have a holistic view of our clients but we specialize in the vocationally oriented part of the rehabilitation.

The aim of our rehabilitation work is to achieve independence for the visually handicapped in their overall situation, i. e. work - home - leisure.

Independence enables the visually handicapped to live a life in society on the same terms with the same rights and the same responsibility as those with no visual disability.

Our aim is to create these opportunities together with the visually handicapped during the rehabilitation work at the institute.

We start from needs and abilities of the individual, which determine what measures should be taken to eliminate or compensate for the vocational impediments of the individual. An individual plan of action is then set up as the basis for the rehabilitation work.

The four main parts of our activities are

1 an **assessment** of the individual's visual ability with the view of choosing adequate aids - of giving the right training to compensate for the visual impairment and to find the right employment

2 **training** of braille, tape recorder technique, mobility, training of suitable computers with braille and synthetic speech with the view of compensating for the visual disability

3 **vocational guidance** - individually or in groups - in order to find suitable employment, based on the individual's interests and visual ability, and then to help him find his way onto the labour market, first as a trainee and then as a regular employee

4 **adaptation of work-place** - to make an assessment of the needs of aids and facilities at the work-place, to ameliorate the working environment by arranging e.g. good lighting and contrasting effects and to help the client get used to different technical aids

In our experience someone who has once been rehabilitated will not be rehabilitated for ever. Visual impairment changes - tasks change - the technique develops - which means that after some years we often make new efforts.

For further information, please do not hesitate to contact us.

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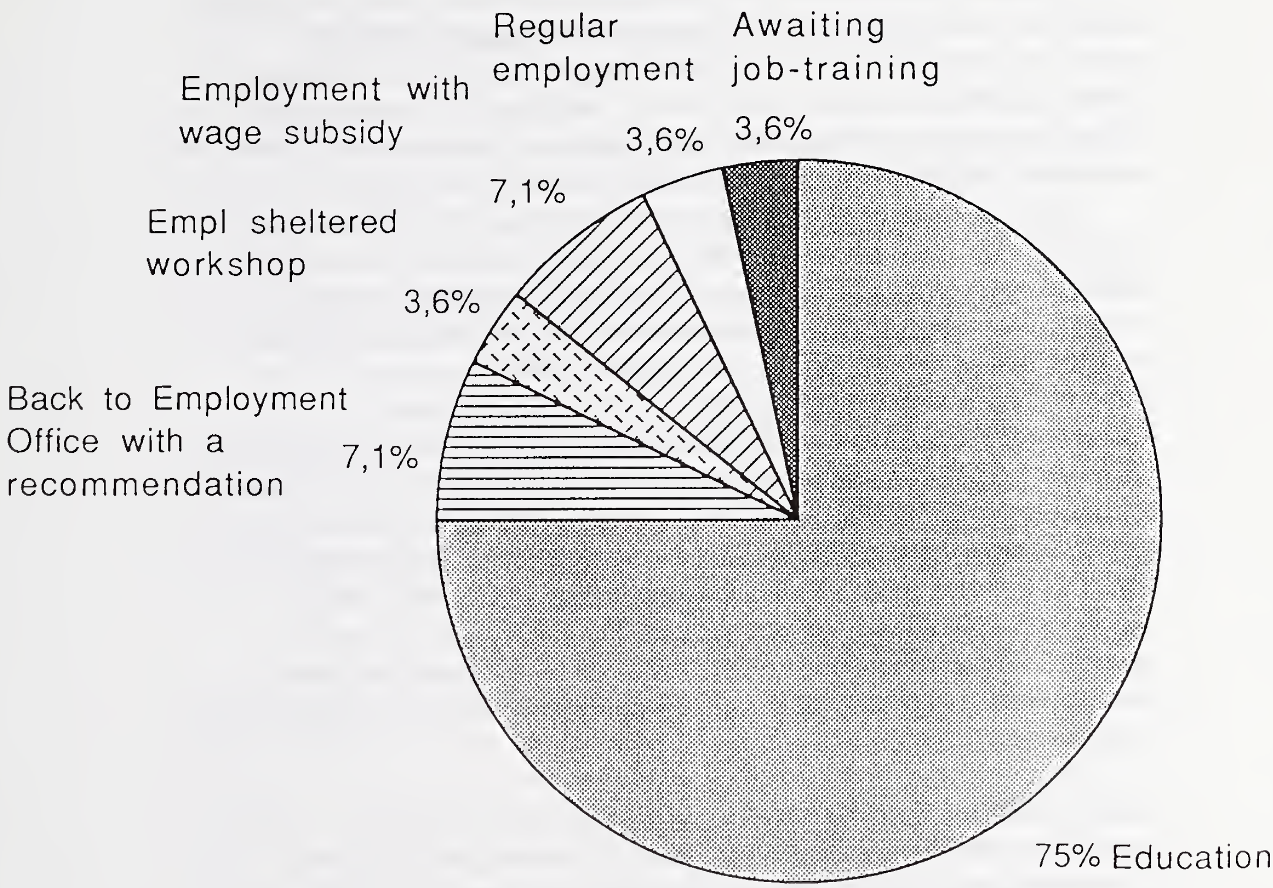
Ami-Syd
Employability Institute

Dept. for the Visually Handicapped

Number of people enrolled for assessment: 57
Number of people with assessment completed: 25

July - December 1993



ROLES AND FUNCTIONS OF MOBILITY INSTRUCTORS WHO ATTENDED THE IMC6

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During a workshop held in Madrid in 1985, a group of mobility instructors from Europe and the United States began an informal analysis of their work. This included comparisons of their training, the types of agencies in which they worked, and the clients they served. From these informal discussions, we proposed to develop and administer a questionnaire survey to participants of the IMC5.

The purpose was to gather data on the roles and functions of mobility instructors who attend the IMC with the assumption that the majority of the participants are from Europe. Secondly, we were interested in comparing the roles and functions of European instructors with the results from a similar questionnaire which had bee administered to mobility instructors from the United States. Specifically we wanted to describe the education and work experiences of the participating mobility instructors, the facilities in which mobility instructors work, and to identify the types of populations that are being served. From the study completed at the IMC5, we identified low vision as a major point of need and interest as reported by O&M instructors. Therefore, we restructured the survey with additional questions in the area of low vision. This paper presents the results from the IMC6 and concludes with an analysis of the IMC5, IMC6 and USA studies.

INSTRUCTOR DESCRIPTIONS. A total of 100 instructors participated (40 Spanish and 60 English). The average age of the participants at the IMC6 was 38 years, with a range of 24 to 78. 58% of the participants were male with 41% being female. None of the

who wished to do so in the future. The forum gave people a broader understanding of vision impairments, the services available and different perspectives on approaches to adjustment.

The objectives of the program were to provide contact with other people who were vision impaired; to discuss and resolve difficulties experienced through an exchange of information amongst professionals and peers; to have individuals contribute to running the seminar by indicating an area of interest or concern that they wanted included in the seminar; and to increase individual self-esteem through participation.

The response to the program was overwhelmingly positive. Participants requested the program to be longer to enable more in-depth discussions on various aspects of rehabilitation. Each discussion went over time as people were reluctant to finish. Others felt that their confidence had improved through being able to share experiences with peers who were vision impaired, and that their outlook on life in general would be different and more positive as a result of the program.

It is important for us to remember that O & M for an individual can be the key to many opportunities in a person's life; but equally it can be the aspect of a person's life preventing full participation. The acceptance of using different methods of travel can be very difficult for the individual.

It is therefore essential to develop varied programs that will enable people to achieve independence. The Mobility Challenge Course, which is O & M specific, and the Living and Learning Seminar, which is an integrated approach to training, can assist in making that transition less traumatic and less isolating by allowing peers to work, train and identify with others in a similar position. In addition, groupwork is an expedient way of instilling confidence in consumers by sharing the problems, the strategies and most importantly the successes together.

Two groups were targeted for this course: adults who had recently undergone mobility training or who needed a refresher course and, secondly, students who were leaving secondary school to go on to tertiary study or work.

There were many positive outcomes for people. A young woman with retinitis pigmentosa was aware that very soon she would have to rely even more on her orientation skills. She enjoyed the challenge in completing each exercise quickly and efficiently. Her confidence grew and her matter-of-fact approach was very encouraging to other members of the group.

Group support increased as people became familiar with each other. People also realized that individuals had different needs and were supportive of this. Encouragement came from the group to solve individual problems. People found it useful to share mishaps and to laugh at difficult situations. As a result, attitudes to independent travel had changed by the end of the week and each person felt confident and positive about his capabilities.

The second program, the Living and Learning Seminar was a live-in program held at a country property north-west of Melbourne. The program aimed to provide people with a forum to meet others who had also recently lost their sight. The seminar was structured so that people would be able to discuss and perhaps resolve various concerns. Over three days there were sessional group discussions combined with recreational activities. The discussion topics centred around O & M issues such as acceptance of vision loss and cane use, family reactions, independent travel, shopping, as well as daily living skills and dealing with losing contact with friends. Information on topics to be covered was gathered from participants prior to attending the program. The program was facilitated by an Occupational Therapist and an O & M Instructor to provide a more holistic, integrated approach to the concerns raised.

Scheduling this program around the O & M training of individuals provided added support for those already undergoing training or

ENVIRONMENTAL MODIFICATIONS

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Any efforts in assisting individuals with a vision impairment to function independently must include a consideration of the environment. The quality of the environment in terms of safety, accessibility and convenience is a concern that educators and rehabilitation workers share with their students and clients. The environment can either facilitate or impede the daily functioning and travel of the disabled. Fortunately, many hazardous and inconvenient aspects of the environment can be prevented or modified through relatively simple and inexpensive modifications.

If the ultimate goal of architecture is to create an environment which is both functionally and aesthetically satisfying to its human occupants, then architecture for the vision impaired poses some interesting challenges. It must convey information using channels other than vision. Non-visual cues such as wall texture, hardness of floor, surface changes, temperature and humidity of the room, etc, must be exploited carefully to accentuate and clarify the total environment. Then, as Bernardo (1970) stated, the environment would not only be more richly satisfying to the sighted, but it would provide the means for the blind to enjoy it and to be satisfied by it as well.

The first two days were run by O & M Instructors and covered aspects of orientation theory. A consumer role model also gave two sessions on communication skills in this time. The consumer, a former client, had been through O & M training and experienced the highs and lows of coming to terms with travelling independently. The consumer was someone able to take responsibility for her own travel arrangements and was as resourceful as her needs dictated. She was asked to lead two - one hour discussions on using public assistance, using the telephone effectively, using public transport and responding to the reactions of people in public. Personal experience was used to highlight what she saw as important aspects of communication. At the end of the second day participants carried out a solo exercise in the residential areas which had been used for the orientation exercises.

The third day provided an orientation to the city central business district (CBD), transport reference points and practice at travelling in a busy area. In the evening, a highlight of the week was going out to dinner where the participants had to find their own way to the restaurant. The consumer role model was encouraged to join the group and set an example by attending independently. The third day also included impromptu challenges and focussed on successfully using public assistance.

The fourth and final day began with a talk by a physiotherapist who also had a vision impairment. She spoke to participants on gait and postures which may be adopted by people with vision impairments. Exercises to assist in maintaining correct posture were covered in the session.

Lastly, a final solo exercise was carried out in a busy area to enable individuals to practise relevant skills. This exercise was most challenging as people were dropped off in the CBD and, depending on their level of skills, had to use public transport in the route to be completed. This concluded the week on a very high note.

The onus is upon us as educators and rehabilitation workers and the vision impaired population itself to act as advocates in the field of architectural design and public works. The slide presentation will highlight some general guidelines as well as modifications for specific features such as stairs, elevators, escalators and furnishings. The presentation will by no means be exhaustive but will give sufficient examples of environmental hazards, obstacles and inconveniencies with their modifications in that order. Wardell's (1980) definitions of environmental hazards and obstacles are used.

In conclusion, two points should be remembered. Firstly as Cocke (1992) recently stated, many persons with a vision impairment can use more subtle and individual cuing systems than is being suggested in this presentation. Therefore care must be taken not to be over zealous in our modifications to the environment. Secondly, the guidelines set down here will make little or no difference to the sighted while making all the difference to the vision impaired, nor will they disadvantage any other disabled population.

Feasibility on mountaineering by people with blindness and other visual impairments.

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Once. Madrid

The objective of this study is to analyse and evaluate the feasibility of mountaineering by people with blindness and other visual impairments. For this purpose, a multi-professional team from ONCE has conducted in the past two years, the following project with approximately 100 members of ONCE, all aged between 10 and 30.

The first step was a complete medical examination of all participants. Groups were then set-up based on vision impairments and rehabilitation requirements.

A guiding rod was used for assisting in mobility:

- A rigid rod with 2.5cm. diameter and 2.5m long.
- Used for guiding the hike. The monitor leads with hid/her staff raised in the air, and guides the blind that follow behind.
- Upon achieving a satisfactory level of practice, the blind can actually walk around with considerable freedom and autonomy, enabling them to enjoy the hike.
- The guiding rod can be either ordinary or double, according to the difficulty of the terrain or the risks of the participants.

The different routes were classified into seven classes based on difficulty of the trek.

1.Class one: Easy, 200 metre slope.

A. 1 Lower class: Broad forest treks.

B. 1 Top class: Broad forest treks with added difficulties (orographical difficulties).

Blind individuals were guided using ordinary guiding rods. B2 individuals were guided using voice, movements and guiding lines. B3 individuals are first briefed on the terrain by the monitor and are guided by voice and movements. Other individuals with high visual risk used a guiding rod.

11. Class two: Some difficulty, 400 metre slope.

A. 11 Lower class: Well traced paths.

B. 11 Top Class: Well traced paths, with added difficulties (orographic and physical difficulties).

Blind individuals use ordinary guiding rod, B2 individuals were frequently guided with guiding rods. B3 individuals followed each other closely and used devices for protection. Blind individuals had to use a double guiding rod on the way down. Other individuals with high visual use the ordinary guiding rod.

111. Class three: Somewhat difficult, 600 metre slope.

A. 111 Lower class : variable route along poorly defined paths and treks.

B. 111 Top class: Variable route along poorly defined paths and treks with added orographic, physical and terrain difficulties.

Blind individuals used ordinary guiding rod and devices for protection, although double guiding rod was more appropriate at times. B2 individuals used ordinary guiding rods throughout the trek.

B3 group required a monitor per two individuals as well as protection devices. Other individuals with high visual risk used the double guiding rod.

IV. Class four: Difficult, 800 metre slope.

A. IV Lower class: Mixed mountain terrain, up to 2000 metres high.

B. IV Top class: Mixed mountain terrain, up to 2000 metres high with added orographic and weather difficulties.

Blind individuals used double guiding rod and protective devices. B2 individuals use ordinary guiding rods and double rods at times. B3 group required a guide (line , voice, guidance, visual assistance). Other individuals with average visual risk used a double or ordinary guiding rod, depending on wether it was lower or top class terrain.

V. Class five: Very difficult, 1000 metre slope.

A. V lower class: Mixed mountain terrain, up to 3000 metres high.

B. V Top class: Mixed mountain terrain, up to 3000 metres high, with added difficulties: orographic and weather. Also, knowledge and experience of the materials used, harness, ropes, safety hooks, etc...

Blind individuals used double guiding rod, occasional use of ropes and two monitors (in front and behind the individual). B2 individuals used double guiding rods and harness for top class terrain. B3 group occasionally required guiding rod and optional use of harness. Class five is the limit for individuals with highly visual risk. They used double bar, two guides, as well as rope and harness throughout the climb. Individuals with average visual risk used double guiding rods and harness for top class terrain.

VI. Class six: Extreme difficulty, 1200 metre slope.

A. V Lower class: Mixed mountain terrain, between 3000 and 4000 metres high.

B. V Top class: Mixed mountain terrain, between 3000 and 4000 metres high with added difficulties: Orographic, weather, and materials and climbing skills.

At this level of difficulty, blind individuals, as well as B1 and B2, used double guiding rod and harness, B3 group used harness or rod,, depending on wether it was top or lower terrain. Individuals with average visual risk used double guiding rods and harness. It is not advisable to remain at 4000 metres after 24-48 hours exposure. All individuals will be subjected to a study in order to determine their adaptation to heights.

VII. Class seven. Extremely difficult, above 4000 metres.

We lack the necessary experience for this level of difficulty.

In the past two years we climbed more than 15 mountains of altitudes greater than 2000 metres and hiked through all sorts of terrain of diverse difficulty. This proves that although mountaineering involves risks, the method described in this study provides an efficient and safe way for people with visual impairments.

In these two years, we have seen how this experience has been very beneficial, both for the medical and sports study and for the rehabilitation. Mobility and self-esteem have also improved. For these reasons, we encourage mountaineering as an activity for people suffering from visual impairments and blindness.

FUNCTIONAL ASSESSMENT, EVALUATION AND TRAINING OF LOW VISION ELDERLY CLIENTS IN RESIDENTIAL ACCOMMODATION.

GAYLE CLARKE

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The Australian Bureau of Statistics (1988) has stated that "Australia's older population is growing more rapidly than the population as a whole". By the year 2021 it is expected that the 50+ age group will increase by 115 per cent and the 85+ aged by 197.6 per cent. It is commonly known that **vision impairment** is generally associated with age related diseases. As per the Parsifal Report (1987) approximately seven out of every 10 individuals with vision impaired are aged 65 or older. With the projected explosive growth in the aged population one would expect that there should be an International review on support services provided to this portion of the population. Obviously part of that review should be a comprehensive study related to vision impairment and orientation and mobility needs.

The realistic fact is simply, that, today there is insufficient information, support and rehabilitation services provided to this population.

Look at the papers that have been and are to be presented at this conference. How many are specifically related to this large portion of the vision impaired population? To my knowledge there are five. Yes, I know that some of the papers are related to a degree but it does not seem to be **"the fashion"** to look at the many vision rehabilitation needs the elderly have and how they differ quite greatly from the pre-school, children or younger adult vision impaired population.

It is a documented fact that emphasis in rehabilitation and education for the blind and vision impaired, has been focussed on the young. Look at the wealth of assessment and training manuals and kits that are focused to the younger population. In Low Vision for example, documented references relating to children account for nearly 25% of all publications whilst those targeted to the elderly population account for less than 6%. Ironically, in Australia, children account for 6% of the vision impaired population. Doesn't there appear to be a discrepancy, or dare I say a bias, in the preparation of assessment and training materials? One could surely therefore surmise, there is also a bias in the provision of services to the elderly vision impaired population.

As a part of my role as an Orientation and Mobility Instructor I have provided training in residential accommodation sites for both elderly residents and for staff. (These residential accommodation sites consist of hostels for the elderly, retirement villages and nursing homes.) From my experience it became apparent that Low Vision Elderly Clients were not being identified so that the appropriate support services could be provided within the residential settings.

I believe some of the main reasons why this occurred were:

1. Vision impairment is not perceived to be a priority for the health and safety of the individual.

2. The vision impairment had been gradual in onset and is accepted as part of the ageing process rather than an area for habilitation and rehabilitation.

3. Elderly clients are less able to travel to venues for assessments and evaluations.

4. Elderly clients, management and staff of residential facilities are largely unaware of support services available.

A small pilot study was carried out to test my hypothesis with some expected and interesting outcomes. Twelve elderly accommodation facilities were surveyed within the suburb of Kew, Victoria of which nine were able to supply the required information. Each facility was asked to complete a questionnaire, some were completed by telephone and others in a short interview session. There were only a small number of questions asked as the primary purpose of this study was to determine if a more comprehensive study was warranted. I have listed just some of the questions and replies.

QUESTIONS

1. How many beds in your facility?

   RANGED FROM 8 - 99 BEDS, AVERAGE OF 32 BEDS

2. How many of your patients are ambulatory?

   OVER 77% STATED MAJORITY WERE AMBULATORY.

3. How many patients are totally blind and how many have a vision impairment?

   TOTAL PATIENTS = 286, 4 BLIND
   9 VISION IMPAIRED

4. What is your facility's criteria for entrance?

   - Is an optometric assessment required? 92% - NO
   - Is a hearing assessment required? 100% - NO
   - Is a general health assessment required? 50% - NO

5. If one of your patients is having a vision problem, who do you contact?

 MANY DID NOT SEE THAT IT WAS THEIR DUTY TO REFER. OF THOSE THAT DID MOST REFERRED TO THE GENERAL PRACTITIONER.

6. Has your staff had any workshops regarding caring for the vision impaired?

 25% HAD WORKSHOPS BUT THEY DID NOT REMEMBER WHO PROVIDED THE WORKSHOP OR WHEN!

7. Would you be interested in RGDAA providing a workshop for your agency?

 25% - YES, 33% - NO, 42% - UNSURE!

8. Would your agency be interested in participating in a study to assist RGDAA in determining how to direct their services to the elderly population?

 17% - YES, 83% NO OR UNSURE.

CONCLUSIONS

From these findings one may conclude that most clients were found to be, in some way, ambulatory. Surely, this could indicate a need for mobility input for the vision impaired patients within these homes. One can also conclude that environmental conditions for those with a vision impairment, such as lighting, contrast and access within each setting may be placing these residents in potentially dangerous situations.

Let us consider the general elderly population and the many age related sensory changes that occur within this age group. Surely patients within these settings who do not have a vision impairment, along with those who do, would benefit **greatly** from services provided by the intervention of an **orientation and mobility instructor.**

Given that:-

a) less than 5% of the facilities population were identified as blind or vision impaired

b) less than 10% of the facilities required an optometric assessment, and

c) most facilities did not see it as their duty to refer for vision problems,

it may therefore be reasonable to conclude that these facilities do not understand the visual status of their current patients. The Pilot Study data suggests that it is likely these facilities greatly underestimate the extent of the existing problem. As the Australian population ages over the next quarter century this problem will increase in scope and complexity. Delays must not occur in addressing these problems.

Steps which may improve the access to services by the elderly population would need to include:-

- Orientation and Mobility Instructors conducting assessments, evaluations and training procedures for elderly patients within residential accommodation

- the production of training manuals and packages with support materials which will provide comprehensive and multi-disciplinary training to other human service professionals (eg. gerontologists, nurses, occupational therapists, social workers and primary care practitioners)

To the extent that this is an Australian problem, Orientation and Mobility Instructors and agencies for the vision impaired within Australia must begin to address these issues. Of course this is also a global problem and in that context I believe it is fitting that these problems are addressed by this international forum. Funding will always be a challenge to be overcome, however, when we are discussing issues which severely impact on the majority of the vision impaired population, those in the 65+ age range, then we must become innovative and creative in planning and delivering much needed orientation and mobility services. I challenge you over the next two years to evaluate services provided by your country to the elderly population and urge you to continue to conduct research and produce training material which will benefit this population.

I would sincerely like to thank Dawn Veale (Orientation and Mobility Instructor) for her support in gathering together some relevant data for this presentation during her student professional paper.

AGING POPULATIONS AND LOW VISION SERVICES: IMPLICATIONS FROM THE U.S. VETERAN POPULATION

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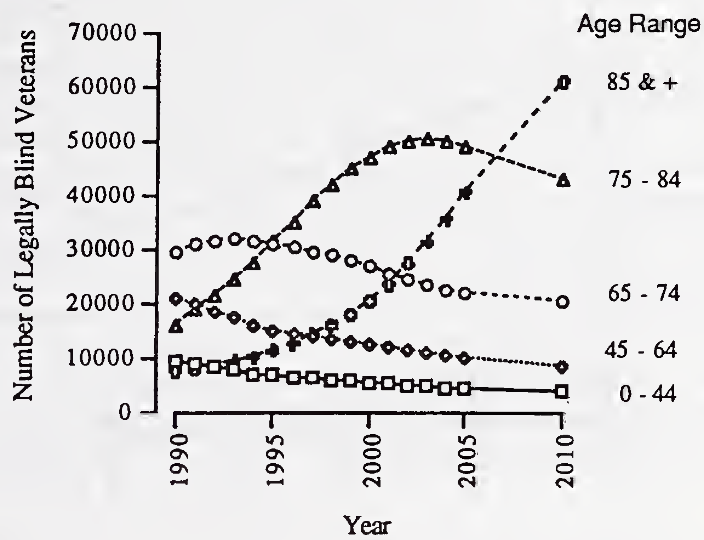
Throughout the world there are far more visually impaired individuals than there are resources to provide them with vision rehabilitation services. The scarcity of resources may be somewhat less in developed countries than in developing countries, however (with perhaps one or two exceptions) no country can boast of an adequate supply of services. Because of the scarcity of vision rehabilitation resources it is important to characterize the severely visually impaired population so that an optimum allocation of scarce resources can be made. Understanding the population will also help eliminate myths about visual impairment and may potentially result in momentum to increase the resources available for vision rehabilitation.

The United States Department of Veterans Affairs (USDVA) currently operates eight facilities specializing in providing vision rehabilitation services to legally blind veterans. A ninth facility will open in the Spring of 1994. The veteran population can be viewed as having general interest because it is demographically well understood and there are systematic data collection mechanisms employed by the USDVA which can be applied to describing the vision rehabilitation needs of U.S. veterans. It is arguable that trends affecting the veteran population are similar to those affecting the vast majority of visually impaired individuals in developed countries.

Much of what is known about the U.S. veteran population gained from the national census, which specifically solicits information concerning veteran status from all U.S. residents. The most recent census was conducted in 1990. At that time there were approximately 27 million veterans in the U.S. Using age data from the census and estimates of longevity for the U.S. population the

USDVA estimates that by the year 2010 the veteran population will have decreased almost 20 % to about 22 million individuals. Additional information about the visually impaired veteran population can be gained from incidence and prevalence estimates (National Society to Prevent Blindness, 1980; Nelson 1987; and Select Committee on Aging, 1992). While the statistical basis underlying these estimates are not as sound as could be hoped for, they are still useful in providing rough estimates of need. The fact that the estimates are similar to those gathered in other countries (i.e., Bruce, McKennell & Walker, 1991) lends credence to their application in this case.

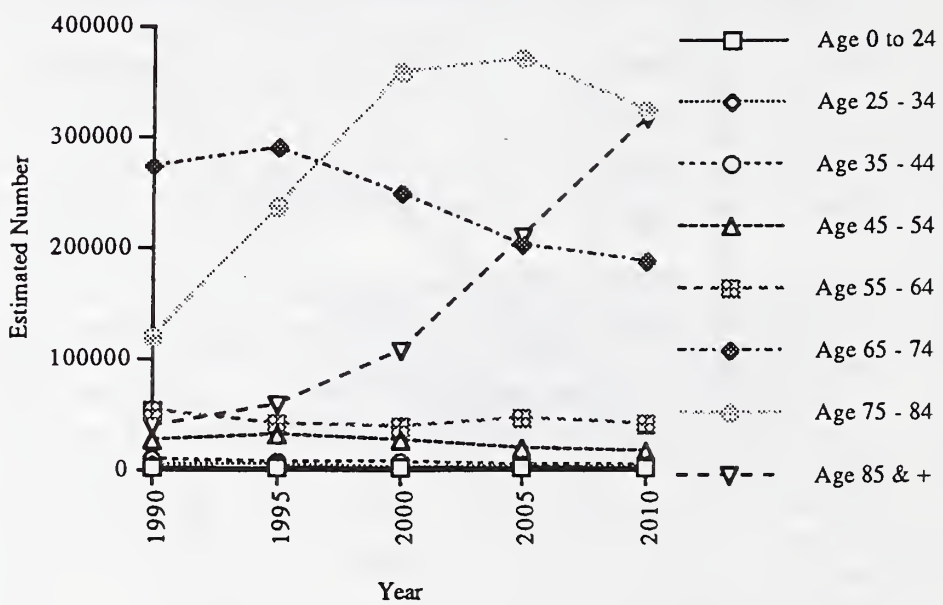
Figure 1. Estimated number of legally blind veterans by age group and year.



Current estimates indicate that legal blindness (defined in the U.S. as best corrected visual acuity in the better eye of 20/200 and/or a visual field that does not exceed 20 degrees) occurs least frequently for the age group from birth to age 44 with an incidence of about 0.0011 per 1,000 individuals. The incidence rate gradually increases for the older age groups and is highest for the 85 and over age group with an incidence of 0.048 per 1,000 individuals.

While these rates seem very low, applying them to the U.S. veteran population shows that they can have a very profound effect. For the years 1990 through 2010, for example, the estimates indicate that the legally blind veteran population will increase from just over 80,000 veterans in 1990 to over 132,000 in 2010. This is an increase of about 160% within a 20 year period. The interaction between incidence and age is shown in Figure 1 which clearly indicates that the increasing number of legally blind veterans will be in the population age 75 and over.

Figure 1. Estimated number of severely visually impaired veterans by age group and year.



Severe visual impairment (defined by the National Center for Health Statistics as the inability to read newsprint with best conventional correction) is estimated to affect less than one half of one percent of the U.S. population under the age of 24 (Select Committee on Aging, 1992). However, as with legal blindness there is a high correlation between aging and severe visual im-

pairment such that about one of every ten Americans aged 75 to 84 has a severe visual impairment and one of every four aged 85 and over has a severe visual impairment. Applying these estimates to the veteran population yields an estimate that in 1990 there were about 480,000 severely visually impaired veterans. By the year 2010 it is estimated that there will be over 830,000 veterans so affected. In the year 2010 it is estimated that about 4% of the U.S. veteran population will be severely visually impaired.

Three eye pathologies account for more than half of all legally blind veteran admissions for vision rehabilitation services: age-related maculopathy accounts for about 30%; diabetic retinopathy for about 12%; and glaucoma for about 11%. All three of these pathologies are age related in incidence, and therefore have a profound effect upon an aging population.

The U.S. Veteran population does not typify the U.S. population as a whole in that it is predominantly male and does not include those aged 17 or younger. Still, it is a population of interest since it clearly shows the effect that severe visual impairment and legal blindness can have on an aging population. It is important to understand this effect since it suggests that in developed countries it will be necessary to allocate significant vision rehabilitation resources to the elderly to maintain their independence. By showing that severe visual impairment affects some 4% of a major portion of the U.S. population, this data also clearly refutes the myth that visual impairment is a low incidence disability. On the contrary in the U.S., with the exception of hearing impairment, severe visual impairment results in more cases of disability than any other physical or sensory loss.

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OPTO-ELECTRONIC CANE FOR MOBILITY AID

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1. Introduction

A white cane is useful for blind persons to check for a clear path at ground level when getting about. It, however, has the disadvantage that it gives no information about obstacles from the waist up, such as the back of the staircases of overhead pedestrian bridges, back of lorries and tree branches.

To overcome this disadvantage, an opto-electronic cane was designed as a prototype, assembled and evaluated.

2. Design considerations

In designing this cane, great importance was attached to the following matters.

(1) To be used with standard cane technique.
(2) To have high reliability.
(3) To take advantage of technologies and components commercially prevalent already.
(4) To have ability to measure distance.
(5) The information about distance is given only by tactile vibrating stimulus.
(6) To be easily operated.
(7) To have reasonable price.
(8) To develop it in close contact with the users and their orientation & mobility instructors.
(9) To have structure and function based on human engineering.
(10) To develop a training program.

3. System configuration

This cane contains a distance measuring system, a tactile stimulating system and an electric power source.

(1)Distance measuring system

This system is placed about 20 cm away from the grip toward the tip of the cane.

From a light emitting diode(LED) in this system, 0.7 ms pulsating infrared light is emitted periodically at an interval of 50 ms. This light is thrown forward and nearly perpendicular to the cane through a light collimating optics and is scattered at an obstacle. A part of the scattered light is received via a light receiving optics by a semiconductor light sensor called position sensitive device(PSD). The position of the light spot on the PSD which depends on the distance from the obstacle is converted to voltage by an electronic circuit.

Thus the distance can be converted to voltage corresponding to its length.

(2) Tactile stimulating system

This system is located just beneath the forefinger of the hand gripping the cane and is so designed that the finger tip may feel the mechanical pulsating frequency of the tactile stimulator. Thus one can recognize the distance to the obstacle by one's forefinger.

The output voltage from the distance measuring system is then converted to the pulsating frequency by another electronic circuit.

The range of the pulse frequency and the pulse width were decided by investigating carefully the sensitivity and the frequency discriminating ability of the tactile sense on the tip of the forefinger, walking velocity of the pedestrian and the lowest possible electric power consumption.

Consequently, optimum relation between distance and frequency was decide, so that the stimulator may not vibrate at further than 3.5 m and it may vibrate at a frequency corresponding to the distance to the obstacle. The shorter the distance, the higher the frequency. To put it more concretely, 5 Hz at 3 m and 50 Hz at 0.5 m. The frequency is nearly inversely proportional to the distance. An optimum pulse width was decided as 2 ms. The mechanical pulse frequency is conveyed through a silicone rubber membrane to the tip of the forefinger.

(3) Electric power source

Electric power to the LED, the PSD, the tactile stimulator and all the electronic circuits is supplied by 4 pieces of chargeable NiCd batteries.

4. Dimensions and characteristics

Dimensions and characteristics of this experimental model are as follows.

- weight of the cane : about 350g
- diameter of the thickest part : 2.7 cm
- detected range : within 3.5m
- detected height : the waist to the head
- stimulating frequency to the finger : 5 to 50 Hz
  corresponding to 3.0 to 0.5 m
- continuous operating time without recharging : 30 hours

5. Evaluation

Distance error, i.e., difference between the recognized distance and the true distance, depends on individuals.

As a result of experiment carried out on the seven subjects, it was found that the standard deviation of the distance error turned out to be 32 cm at 3 m, 26 cm at 2 m and

14 cm at 1m respectively. This result is preferable because the shorter the distance, the smaller the error.

Another experiment showed that measured distance was independent of the colour of the obstacles, i.e., white, black, red and so on.

Measurable distance concerning the particular kind of obstacles was found by experiment, for example, wire netting, glass windows, leafy trees and various thin poles.

6. Conclusions

A battery-powered opto-electronic cane as a prototype has been realized which can detect and measure the distance to the obstacles just in front of one's waist to head when moving about.

Information of distance is given via a mechanical stimulator to the forefinger of the blind person.

Further efforts are being made now to reduce its weight, to make it thinner, to ascertain its reliability, to add to it a monitor for the instructors and to prepare a training program.

Acknowledgement

The presenters of this paper wish to thank the many visually disabled and their mobility instructors for giving them valuable proposals and information and for cooperation as subjects. They also gratefully acknowledge the contributions of Mr. Kyota Yamafuji of Sea Star Corporation for designing and assembling the opto-electronic unit.

THE SONIC PATHFINDER: AUSTRALIA'S FIRST USER

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INTRODUCTION:

This paper including an eight minute V.H.S. video tape attempts to highlight the values and practical applications of the Sonic Pathfinder. It shows the first user in Australia demonstrating the ease and effectiveness of this space age device.

THE USER:

Josie was born in a little town called Murgon, one hundred and sixty miles south east of Brisbane, Queensland. She worked as a switchboard operator and stenographer after leaving the local high school.

In 1958 she joined the sisters of Saint John of God in Broome - Western Australia and did general mission work in the Kimberleys for twenty years. She then moved to Perth in 1978 and taught for three years in an Aboriginal school. Josie lost her vision in 1982 due to diabetes and retinal detachment. She was trained in using the long cane and maintained a satisfactory level of independent mobility. She traillled the Mowat Sensor and the Sonic Guide but declined using these aids. In 1984 she indicated interest in a Guide Dog but due to circumstances beyond her control she has to withdraw her application.

She was introduced to the Sonic Pathfinder and was trained in May 1990. Progress during training was steady and she has achieved a thorough understanding of the aid in 19.75 hours.

On completion of her training Josie wrote expressing her confidence in using the aid and the benefit she is gaining from it.

"I am writing to let you know how much easier travelling has become for me since using the Pathfinder... a little over eight years ago, and still with a tiny bit of vision, I had been experiencing extreme difficulty in travelling through the main city streets with the crowded 'people' traffic. I discovered then how much easier this area could become with the use of the long cane. I have now only light perception and I can honestly say that my first journey with the Pathfinder through this area with its crowd of people, was the easiest since having lost my vision in September, 1982.

In other areas where I previously relied on shoreline buildings and curbs, I now have the pleasure of being able to travel at an even distance from these walls with the assurance that the "Pathfinder" will warn me if I am drawing too close to them and will indicate when I come to the empty 'sound' space of a driveway. Previously, I have many times had to apologise to people standing against buildings as I touch them with my cane but I now find that, in most places, I am now able to step sideways and avoid them. I no longer have to rely on curbs to help me find the audible signals or telegraph poles at which to turn in order to cross a street, as the cheery sound of the "Pathfinder" warns me when I draw near to these landmarks. In less crowded areas my travelling speed has increased. Its tune is a delight to hear as I pass by trees and other objects beside the footpath. It gives also a sense of company......"

Since completing the Pathfinder Programme Josie has continued using it on a regular basis. Her Percentage Preferred Walking Speed with the Sonic Pathfinder has improved and is now 80% from 72.5%, that is time taken to walk at least 200 metres between two landmarks on a route with no road crossings calculating from the time taken (a) with a sighted guide, (b) Primary aid and (c) using Sonic Pathfinder and Primary aid.

THE VIDEO

This video shows Josie on one of her regular routes, travelling from the Association for the Blind, Western Australia to a bus stop along Albany Highway to commence a journey into the city. The trip begins at the front door of the Association travelling through a typical suburban street. The environment becomes increasingly difficult as the trip progresses. She negotiates through construction work, an arcade and performs a perfect controlled pedestrian crossing on busy Albany Highway. She locates her destination with no difficulties.

CONCLUSION:

The video shows that the sonic pathfinder is a simple, reliable aid which can improve a vision impaired persons travel skills when used efficiently.

ACKNOWLEDGMENT:

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Josie for her permission to use part of her letter and recording time and permission in using it for this paper.

AN EVALUATION OF THE SONIC PATHFINDER

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The Western Blind Rehabilitation Center evaluated the Sonic Pathfinder as a secondary travel aid for blind travelers. The Sonic Pathfinder is an electronic travel aid designed to provide environmental information to blind and visually impaired travelers through headmounted ultrasound transducers and ear phones placed in front of but not covering the ears. Ultrasound signals are generated by the device and converted into audio tones reflecting various information about the environment. The system is designed to be used as a clear path detector, rather than an environmental sensor. Artificial intelligence has been incorporated into the device to enable the most salient information to be communicated to the user, thus simplifying the information needed to be processed by the user.

Six orientation and mobility instructors at the Western Blind Rehabilitation Center were trained to teach the Sonic Pathfinder by Tony Heyes and Gayle Clarke of Royal Guide Dogs of Australia. The Orientation and Mobility Section at WBRC developed three evaluation routes to use in the study, one residential with some businesses, one downtown business route, and one rural route. The routes were pretested by instructors and one participant.

Eight subjects completed the evaluation study. The participants were volunteers who had no useful vision and knew how to travel safely using a cane. After receiving training, the participants traveled with and without the Sonic Pathfinder on the evaluation routes. The order of the routes traveled with and without the Sonic Pathfinder varied to counterbalance results due to familiarity with the route. An observer recorded obstacles along the route above the waist and head high, whether or not the obstacles were detected by the Sonic Pathfinder, and whether or not the subject avoided or encountered each obstacle. Special tasks included shorelining a wall to locate a business, counting poles and trees to locate a business, and scanning for a mail box in a rural area.

The time taken to travel the route, the number of cane contacts with obstacles above the waist, number of upper body contacts, the number of overhangs detected or not detected and the number of obstacles avoided by an obvious adjustment in the line of travel were calculated.

The preferred walking speed of each participant was measured for each participant using a short straight route and "reverse" sighted guide. A sighted guide walked slightly behind in contact with the participant to ensure safety, but offered no other guidance. The subject was instructed to walk at a comfortable walking pace without using a cane, relying on the guide for safety, but taking the lead in setting the pace. The walking speed while using a cane only and a cane and the Sonic Pathfinder was also recorded for each subject.

Results and Discussion:

Instructors trained participants to use the Sonic Pathfinder between eight and fifteen hours. Training followed the outline used in the Sonic Pathfinder training manual. At the end of the training, the subjects were familiar with the Sonic Pathfinder and were able to use the device. The instructors felt that training should be increased beyond the length of time used in the study in order for the student to become fully competent using the device.

The percentage preferred walking speed was calculated by taking the percentage of the time traveling a specified distance when traveling with an aid, either the cane or the Sonic Pathfinder and the cane compared with the time traveled the same distance at the participant's comfortable walking speed. The percent preferred walking speed was the same or less for the subjects while using the Sonic Pathfinder and a cane, than with a cane only.

When traveling the residential route, all except one of the test subjects were slower with the Sonic Pathfinder than without it. Contacts with obstacles by the cane and body were significantly reduced when using the Sonic Pathfinder. Significantly more obstacles were avoided without contact when using the Sonic Pathfinder. Overhangs were generally detected although some subjects picked up a warning of high overhangs that were too high to be encountered by the subject's head.

The downtown business route again showed less contacts and

more obstacles avoided while traveling with the Sonic Pathfinder. Most subjects were slower while traveling the route using the Sonic Pathfinder than when using a cane alone.

Most of the subjects were not skilled at rural travel. This route was included because electronic travel aids can be useful in a rural environment. Subjects found that the Sonic Pathfinder was useful for negotiating overhanging bushes and trees along the path and for using a line of trees as landmarks to cross a field. Most of the subjects liked the extra information obtained by the Sonic Pathfinder in these situations.

All of the subjects rated the Sonic Pathfinder very easy to moderately easy to learn and use. They also stated the Sonic Pathfinder helped them avoid obstacles at least some of the time. Instructors thought that six of the participants' travel skill improved with the use of the Sonic Pathfinder. Correspondingly, most of the subjects felt more comfortable using the Sonic Pathfinder. Some of the subjects felt that they were occasionally given irrelevant information, particularly high obstacles that were located above the head.

Subjects located the mailbox in the rural route and were able to use the Sonic Pathfinder to maintain a straight line of travel. However most of the subjects had difficulty counting a series of trees and poles to find the entrance to a business. A narrow alley way was also difficult to locate.

In general the subjects commented that they experienced using the Sonic Pathfinder as "safer and slower". Another comment was feeling "more confident." All of the subjects except one felt more comfortable traveling with the Sonic Pathfinder. The device was found to be extremely reliable, seldom not detecting an obstacle, although subjects sometimes did not respond to the signal.

Instructors at WBRC would recommend at least two weeks of training with the student practicing consistently over time, more if needed for the student to be fully comfortable using the device in relevant situations. Increased training and more practice would probably increase the speed at which the subjects traveled, as well as increase the effective use of the Sonic Pathfinder to locate landmarks such as a series of poles.

The Sonic Pathfinder improved travel, safety and comfort for most participants in this study.

Sonic Pathfinder: Utilised by "Geoff", an Intellectually and Vision Impaired Client.

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Abstract. A single case study demonstrates a client with an intellectual and vision impairment successfully learning to utilize the sonic pathfinder. Two training strategies were used in amalgamation throughout the program namely non-verbal hand over hand shaping and errorless learning. When applied in a structured and consistent manner, these training techniques may enable the multi-impaired individual access to the variety of electronic mobility aids.

1. Background

Today's presentation celebrates learning ability. The ability to learn, regardless of the degree of vision loss or the degree of intellectual impairment.

It is with great fortune that we belong to a small, yet committed team within the Guide Dog Association of N.S.W and A.T.C Sydney, whose work includes a focus on mobility programs with multi-impaired individuals.

It is our essential proclamation that such clients can learn to utilize canes, can learn orientation and mobility, and indeed, can learn to utilize the variety of electronic aids available in the mobility field today. Successful learning, however, appears dependent upon the training strategies adopted and, more importantly, their adaptation to the individuals specific mode of learning [1].

By no means are we advocating any new brilliant or bizarre piece of training technology. However our consideration is to highlight the power of two particular training strategies when used in amalgamation. These include firstly; errorless learning and secondly; non-verbal hand over hand shaping.

A crucial element before applying training strategies is that of an initial observation and assessment period where clients have the opportunity to show us and we can observe, how they best learn. Often this approach also serves to overcome other program challenges such as behavioural problems, allowing the source of client frustration to be discovered.

Many within this client group have limited, if any, verbal skills, few receptive communication skills and limited concept development. Often these clients have little understanding of the environment, or its function and how people relate and interact in it.

It has been observed, that a characteristic specific to many program failures, is that of client verbal dependency [2]. That is where the client has learnt to respond correctly only when verbally cued or reinforced by the instructor. Non-verbal shaping, however, appears to prevent this difficulty by way of instruction through silent hand over hand shaping. During the initial stages of training, brief verbal and physical interaction occurs to promote rapport, to praise and encourage client motivation. Once rapport has been established, verbal interaction is faded and replaced by intermittent and brief physical reinforcing touch. This strategy reduces verbal cue dependency, promotes client concentration and allows the timely fading of the instructor's presence to be carried out with ease.

2. Case Study

In 1993, a training program was created to instruct "Geoff" on the sonic pathfinder. Geoff is a 29 year old male, blind as a result of head injuries. Typical of Frontal Lobe Syndrome is loss of motivation, impulsiveness, reduced attention span and displays of inappropriate social behaviour [3].

Throughout the program non-verbal shaping was utilised in amalgamation with errorless learning strategies. That is, for a majority of the training, Geoff was placed in situations where he consistently experienced the pathfinder's feedback and where he could do none other than listen to the feedback and respond correctly. In this way, toward the latter stages of training when instructor presence commenced fading, Geoff consistently responded accurately to the pathfinder feedback. On an infrequent occasion, when Geoff did make an incorrect response, he error corrected almost immediately. This may be attributed to program's structure and consistency making incorrect responses unfamiliar and uncomfortable. Such error correcting behaviour evidently, has been found to occur in a variety of orientation and mobility training programs [4].

To be labelled as "intellectually impaired" is not to denote an inability to learn. It simply denotes a different way of learning. It is our role as mobility instructors, psychologists and educators to identify and apply training techniques to suite the individual's mode of learning. In this way, multi-impaired clients may finally be included in the group already reaping the benefits from electronic mobility aids.

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NEEDED, AVAILABLE AND USEFUL INFORMATION FOR BLIND PEDESTRIANS

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Traditional travel aids for the visually impaired, such as the long cane and the guide dog, have been remarkably successful. However, this is not true of Electronic Travel Aids (ETAs). Why is there a difference? I think the reason is that whereas the traditional travel aids have made available useful information that is highly needed, the same can not be said about ETAs. An important prerequisite for developing new ETAs is to consider what kinds of needed information *are not* available in a useful form, as well as what *is* already available to the blind traveller. The aim of this paper is to elaborate on what information is needed, available and useful for blind travellers. I hope there can be a discussion about what aspects there is general agreement about, and thus maybe considered trivial, and what aspects are controversial.

Needed information

What information is needed for successful locomotion is, to a large extent, common to blind and sighted travellers, as well as to other animals. Among the most important things you need information about is (1) the walk-upon-ability of the ground, and its depressions and protrusions, (2) the location of near objects, especially obstacles to be avoided, in relation to the travel path, and (3) the direction to more distant (sub)goals to be approached (cf theoretical discussions, such as Foulke, 1971, 1985; Jansson, 1991; Strelow, 1985).

An important problem to consider is if there is information that is needed specifically for the visually impaired. However, this may not be so easily determined. For instance, it has been found that

blind persons memorize more details in their route descriptions (Brambring, 1982). Does this indicate that their needs are different? Not necessarily. It may indicate their need to pay more attention. Sighted people may get information about these details by, for instance, peripheral vision without conscious effort. And consequently, they do not need to memorize them. So far, I assume that the needs are the same, but there may be differences in the amount of attention necessary.

Available information

For the sighted most of the needed information is available in ambient light (when not in total darkness). The seeing traveller has just to look around, usually without any special effort. The visually impaired have to be more energetic in their exploration of the environment.

Of the three kinds of needed information mentioned above, information about the ground is available with the aid of the long cane or the guide dog. This is probably the most important kind of information provided by these traditional aids, and it is mainly available for the haptic sense via the hand holding the cane or the harness of the dog. Hearing also presents some information about the ground (cf. Schenkman, 1986).

Secondly, information about near objects is available for the visually impaired from the haptic sense via the two traditional aids, and from ordinary hearing, as well as from hearing by echolocation (cf. Schenkman, 1985). This is probably the kind of information most inventors of ETAs have had in mind for their devices (cf. the overview of the efforts in Warren & Strelow, 1985).

The third kind of needed information has not been paid as strong attention as the second kind. However, it is a most important kind. Indeed, I think that the only limited success of the ETAs depends, at least partially, upon their, largely providing information only about near objects (Jansson, 1987, 1991). Most ETAs have a range of only one meter or a few meters. In addition, the information

they make available is very meagre, in many cases this is only about the existence of an object within the range of the device and sometimes also about the distance from the observer to the object. No ETA gives a clear identification of the objects.

This lack of information about more distant objects presents, I think, the most urgent task for those wanting to provide the visually impaired with new ETAs for orientation and mobility.

There is one kind of potential solution that deserves special attention at present, namely the efforts to make some version of the Global Positioning System (GPS) available also for the visually impaired (Loomis, Gooledge & Klatzky, 1993, have started a project of this kind; projects are planned also in Europe). Such an aid can give information about the position of the traveller, as well as important objects at any distance. If it is possible to provide information in a useful form about, for instance, the direction to more distant (sub)goals, this may be an important improvement of the possibilities for independent travel for the visually impaired, especially in unknown areas or when they are lost in familiar areas.

Useful information

It is, of course, not sufficient to make information available to the visually impaired traveller. The information must also be in a useful form. This may seem self-evident, but none the less it seems not seldom to have been forgotten, or at least not been given sufficient attention, when ETAs are developed. The usefulness of the form of information presented by ETAs should be studied as early as possible in the development of the aid and there should be careful evaluation of this aspect of the final device before making it commercially available (cf. Jansson, 1993).

Conclusion

A most needed additional information concerning orientation and mobility for the visually impaired is about the direction to more

distant (sub)goals. Now there seem to be technical solutions for this purpose within reach. Thus a most urgent task at present is to develop a device that makes available such information in a form useful for a person who can not see.

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POSSIBILITIES AND LIMITS OF THE GUIDE DOG FOR THE BLIND AS AN INDEPENDENT WAY OF LOCOMOTION

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I. INTRODUCTION

Function of the guide dog: to guide a person struck down by blindness or very low vision to avoid her the obstacles of traffic, town or country.

Technical requirements to reach this aim:

- races choice:
Labrador, Golden Retriever (or cross), German Shepherd.

- dogs selection (criteria to observe):
Sociability,, no aggressiveness, intelligence, exemption from physical defects (hyp dysplasia, retinal problems) or behavioural defects.
Research of well-balanced and healthy breeders, severe selection of puppies, systematic elimination of the individuals that do not fit with the criteria.

- training and skills of the instructors:
The training staff for guide dogs must undergo a three years long training (after the General Certificate of Education) in a guide dog school that will dispense practical knowledges. Each student will do a eight weeks work experience in a Mobility Centre. He will also do a four weeks work experience in a veterinary school. At the end of each year, he will have to pass an examination and to obtain the diploma of the French Federation of Guide Dogs Schools for the Blind at the end of this training if he wants to integrate into a guide dog school affiliated to the French Federation. The schools structures and the staff must fit with the standards required by the International Federation of Guide Dogs Schools for the Blind.

- selection and training of the blinds to make them suitable for the use of a guide dog:
The blind persons who want a guide dog must contact the Federation or the school of their region that will invite them to have a two days long pre-training to get in touch with instructor unit, to familiarize with the dogs, to undergo a medical examination and an examination that will determine their physical and behavioural possibilities (balance, sens of direction, several handicap...). It is a multidisciplinary unit, constituted by a guide dog trainer, a mobility instructor, a psychologist, a doctor, that will determine the skill of the blind person to obtain a guide dog. It can postpone the demand to allow the blind person to have a locomotion training and a rehabilitation of the everyday life so he will be able to apply again for a guide dog. It can also, in extreme cases, reject definitely the demand for reasons of total incapability.
If the demand is accepted, the corresponding dog to the blind person will be educated. The person will stay at school for two weeks to learn how to use his guide dog and a training of one week will be done where the blind person lives.

II. POSSIBILITIES OF A GUIDE DOG

- The guide dog liberates his master of his dependence of people closed to him, giving him the possibility of independent locomotion,

- Independence levels very different according to the persons:
age, physical conditions, psychomotor possibilities, will, etc...

- Practice of leisure sports, excursion in town or in country, easiness of movement with professional characteristics,

- Shopping

- Use of the public transport: train, bus, subway, plane...
therefore improvement of the everyday life from which best integration in society.

III. LIMITS OF A GUIDE DOG

Of course, the dog has its limits. It is first a living creature that has its own character and problems inherent in its race. It can be in poor form, have accidents, illness and its life is quite short. The owner must know that and assume this responsability toward his dog. He must feed it

correctly, to make it undergo veterinary examinations and regular vaccinations, as well as all the cares the dog needs. He must provide a comfortable environment but proper to a dog (he must not do anthropomorphism).

The dog is not supposed to know where its master wants to go, so the owner must know the routes he has to make very well so as to guide correctly his guide dog. At least, he must be master of the situation. This will ask him some will, a big motivation for independance that will oblige him to overcome his fears in the heavy noises of traffic.

The important thing to do to obtain the maximum of the guide dog services is not being limited to the knowledges the blind person learnt at the guide dog school but to have the will to make his dog progress and to progress himself in his possibilities. For that, he will keep in touch with the school.

Our Conference will be supported by a videofilm. This film will show you the steps of a blind person, or with a low vision, in a guide dogs school, the estimation of her multidisciplinary abilities... It will also show you the varied possibilities offered by a guide dog to blind persons in different aspects of the everyday life. The guide dog owners will testify to their life with their companion and will show how this dog helps them to become better integrated into the environment. It will also develop the limits of the guide dog and the differences between those persons using this way of independent locomotion while knowing that thanks to their dog (without being able to come back to the same possibilities as if they had their own eyes) they have all the same acquired a bigger freedom.

CONCLUSION

At the present time and with the knowledges we have about the guide dog as a way of locomotion, we can affirm that, when all conditions are put together for the success of the couple owner/dog, this way of independent locomotion seems to us to be the most reliable and reassuring for the travellings of the blind person and, which is not insignificant, this person possesses, in addition of a freedom that the dog gives to him, a faithful and intelligent companion that will bring him a lot of joy.

GUIDE DOG MOBILITY
FOR THE O&M INSTRUCTOR

JOHN F. GOSLING

GUIDE DOGS FOR THE BLIND ASSOCIATION OF QUEENSLAND

1. The Guide Dog:

The human and canine families are similar; both respect proven leadership and will work co-operatively for the benefit of the group.

They will share food and shelter and will protect their family or pack and will interact emotionally within their group.

Dogs are arguably the only species to have allowed themselves to be domesticated and have adopted people as 'other dogs' and pack members.

The Guide Dog team is a most graphic example of inter-species co-operation. World-wide, guide dogs are bred specific to task, achieving a predicably reliable 'type' at a significantly higher rate of success than puppies or adult dogs selected at random.

Puppywalking programs are designed to provide puppies and young dogs with the opportunity of 'socialisation' with both the human family and within the broader environment. This (usually) twelve-month period of physical and temperamental development increases the likelihood of the dog developing confidence in all environmental and emotional situations.

2. Guide Dog Client Referrals:

Guide Dog mobility is an additional independent travel opportunity for long cane users.

Orientation and Mobility Instructors, to the benefit of their clients, are a frequent referral source for potential guide dog applicants.

Orientation and Mobility Instructors do provide an important link between their client and a Guide Dog school.

Their professional referral will facilitate the applicant being interviewed by a representative of the Guide Dog school, usually a Guide Dog Instructor.

3. Guide Dog Interview:

A Guide Dog interview is the effective communication of information about Guide Dog mobility to a person with a vision disability so that they make an informed choice as to whether they make application to be assessed for their readiness for guide dog training.

4. Guide Dog Assessment:

The Guide Dog assessment is almost always completed by a Guide Dog Instructor and will involve both a personal interview and a functional assessment through the application of the criteria for acceptance for guide dog training.

The Guide Dog Instructor will assess for the person's:

* positive motivation to use the dog as a means to independent mobility;

* ability to achieve the leadership role in the person/dog relationship;

* physical capability for controlling the dog and ability to give it sufficient daily work to maintain a safe and satisfactory standard of guiding performance;

* dynamic orientation to those travel routes and destinations that will be used during and/or immediately after the guide dog training program;

* extent of vision disability to determine their dependence on a primary aid for their safe mobility and on senses other than solely vision to maintain their accurate orientation;

* ability to detect the locality and directional flow of vehicular traffic, which will enable safe road crossings and facilitate the reinforcement of the guide dog's appropriate traffic training;

* ability to provide the dog with the required nutrition, health care and suitable accommodation.

Subsequent to the assessment, the Guide Dog Instructor will make recommendation about the applicant's readiness for guide dog training and the most relevant training venue.

The principle of 'least restrictive training environment' most appropriately applies. This may be a residential (Guide Dog School based) or domiciliary (home based) or a combination of both.

5. Route Orientation for Guide Dog User

In years past, there existed a clear demarcation between the role of the Orientation and Mobility instructor and the Guide Dog instructor.

However, through inter-professional education programs the line separating instructional responsibility has been erased or at least blurred.

Orientation and Mobility instructors do regularly receive referrals to provide route or building orientation to Guide Dog users and, for those Orientation and Mobility instructors who may not have had this educational opportunity, these simple instructional procedures may prove useful.

(i) Provide route orientation to the Guide Dog user without the presence of their dog while utilising a sighted guide technique. This will enable the instructor to provide a detailed explanation of the route or building without incurring the interference of the dog or causing it to become confused.

This approach is necessary, as when the dog is initially walked over the route, the line of travel must be continuous and accurate. This will ensure that the most appropriate pattern of learning is presented in the first instance and, accordingly, be reproduced in the future.

(ii) Complete the same route/s while still using sighted guide technique but, at this stage of learning, the Guide Dog user is now walking with the dog 'on leash only'. This allows the dog to experience the route without having a guiding responsibility.

(iii) Repeat the route/s semi-solo while following the Guide Dog user (at approximately 1-2 metres distance) with the dog now guiding in harness.

(iv) Repeat the route again solo, while observing the Guide Dog user (at approximately 20 metres distance) with the dog guiding in harness.

Almost all Guide Dog organisations have a 'positive' rather than 'negative' philosophy of training. Guide Dog trainers apply principles of 'operant learning', association of ideas and shaping as well as using positive and negative reinforcement to establish the required patterns of guiding and social behaviour.

Guide Dog training programs vary in length from four months to a year in duration.

The Guide Dog, while responding to the leadership of the blind person, will guide in a straight line and only deviate when required by a physical obstruction or as directed by the handler.

The dog will stop at street intersections and prior to going up or down stairs, not proceeding forward unless it is safe to do so.

These dogs can provide guidance with reduced direction on previously learnt routes and re-locate known destinations. Although it is not directly sought, by association, the guide dog does provide the blind person with personal security.

The guide dog does not work in total isolation from the handler, but rather in unison.

Sometimes the handler provides maximum control and direction and at others the handler relies upon the dog to use its vision and initiative to make appropriate decisions and guide them safely.

The guide dog unit is a partnership with both handler and dog working co-operatively to achieve travel objectives while enjoying a close bond of mutual trust and affection.

The instructional focus should be on the utilisation of auditory, thermal and olfactory environmental information as well as tactual sensory feedback received through the Guide Dog user's feet.

Time and distance travelled associations are also beneficial in teaching Guide Dog users route orientation.

Conclusion

Orientation and Mobility instructors have a valuable role to play as a **potential referral source** for clients who have an interest in Guide Dog mobility, and through the provision of **route and destination orientation** for Guide Dog users. This is particularly relevant in circumstances where the services of a Guide Dog instructor are not readily available.

The positive co-operative relationship that has developed over recent years between the Orientation and Mobility instructor and Guide Dog instructor is to be encouraged, resulting in increased mutual trust and professional understanding.

As a consequence of this spirit of professional respect, people who are vision disabled will substantially benefit through access to improved services.

DIFFERENCES in the TEACHING & LEARNING PROCESSES for the GUIDE DOG and LONG CANE CLIENT MOBILITY PROGRAMS

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Chief Guide Dog Instructor
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THE AIM OF THIS PAPER is to give some awareness to the many mobility personnel here who may not be aware of some of the differences in the processes involved in learning and teaching Guide Dog mobility as opposed to Orientation & Long Cane training

LEARNING PROCESSES -

The Guide Dog:
When properly controlled, the aid can guide its handler safely and effectively under normal environmental conditions. As the dog is a complex organism, it is essential that its user understands and controls it, before effective use can be made of it.

i. Personality Involvement The handler learns to be assertive over and exercise consistent control over the aid. S/he learns extensively about the psychological characteristics of a dog, how it learns and functions and how to use these characteristics to advantage

ii. Voice Control The handler is taught to control the aid through effective authoritative vocal interaction. Flexibility in conveying pleasure, persuasion, intent and admonition is learnt

iii. <u>Physical Control</u> Physical and assertive interaction are learnt through:

a) Grooming, obedience, praise, admonition
b) Leash control - when the dog is both 'working' as well as off-duty
c) Harness/leash control - over general performance, speed of walking, interaction controlling the dog's concentration on tasks

iv. <u>Husbandry</u> The client is taught how to manage the dog's basic needs, i.e. feeding, basic health care, toileting needs

v. <u>Mobility Concepts</u> The client is trained using much of the same conceptual principles that are learnt in general mobility training, i.e. straight line travel, grid patterns, spatial awareness, directionality, making turns, traffic decisions, steps, crossing roads, controlled crossings, traffic lights, public transport, etc.

vi. <u>Use of Hearing</u> More than other sensory input, hearing is a sense particularly utilised by the Guide Dog user, e.g. traffic decisions at road intersections, echo location of open spaces, objects

The Long Cane:
The long cane user develops a higher degree of sensory acuity and a resultant ability to utilise environmental information. At the same time, precise technical skills in manipulating the long cane in different environmental circumstances are learnt. Concurrently, the client learns the geography of their routes travelled and respective landmarks necessary to safely negotiate the route.

The Instructor focuses on the following areas:

i. Cane Technique A variety of techniques and skilled use, appropriate to specific situations, is learnt

ii. Sense of Hearing Dependent upon the state of their auditory capacity, the long cane user is taught to locate, discriminate and understand the various types and phenomena of sound.

In particular, traffic situations, alignment in relation to what they hear, and to make use of such features as echo location and sound shadows

iii. Sense of Touch Tactile attention to changes in surface through the cane tip, feet, hands and the relevance of these changes to routes travelled and significance of wind direction, air draughts, sun position, sense of balance and detection of gradients are learnt

iv. Sense of Direction The Orientation & Mobility Instructor analyses and develops this through teaching the client concentration exercises, sensory acuity and memory skills

v. Re-orientation Skills The client is taught re-orientation techniques when temporarily lost, by utilising mobility principles concerning geographical detail, hearing and direction taking

vi. Corner Detection Through sensory development and cane technique, corners at road junctions are detected without difficulty

GEOGRAPHICAL PRINCIPLES -

The Guide Dog:

i. Based on the grid system, when route teaching is necessary, some of the terminology and concepts to be fully understood are: upkerbs, downkerbs, corners, crossings, offset crossings, shorelines

ii. Routes are taught with *very little* geographical detail. The most commonly used landmark is the road corner. Very little use is made of surface textures or static features such as telegraph poles, however some users find the Mowatt Sensor to be a very effective supplementary aid.
The benefit of the dog is that, **provided it is effectively and efficiently controlled by its handler**, it can detect objectives as long as the handler has a general concept of location of such objectives. Once the dog has learnt the way, a little encouragement at the right time is all that is needed to locate objectives. Echo location can be a useful skill for the Guide Dog user, e.g. in detecting bus shelters, open doorways, etc.

Long Cane Users:

i. Geography has much more significance for the long cane user. A general concept of the route(s) travelled, as well as detailed knowledge of the landmarks, is essential

ii. The geographical terms are more varied and numerous than in Guide Dog work, because terms used are related to the client's frame of reference in space, although are similar to Guide Dog user's terminology

iii. Clients utilise gradients and surface textures as significant clues

iv. They need to learn to locate relevant landmarks, such as bus stop signs, street crossing poles and the significance of such are essential in locating more difficult destination points

v. They also must learn the nature and texture of building shorelines, where significant at difficult corners, and at each side of objectives, such as shops

TEACHING APPROACHES -

The Guide Dog Mobility Instructor must

i. have the ability to train the aid and educate the client with knowledge to effectively utilise a safe, effective aid

ii. be competent at teaching clients how to control and maintain the dog's working ability consistently, as ultimate safety is dependent on this

iii. educate the client to the relevant principles of Orientation & Mobility, relevant to Guide Dog mobility, and explain that Points 'ii' & 'iii' must be used concurrently

iv. teach the low vision Guide Dog user the effective low vision strategies that are not only advantageous to the handler but complement and reinforce correct trained working behaviour of the Guide Dog. Flexibility in each program is therefore essential for these aims to be carried out

v. design their client training program as a result of an accurate assessment that considers each client's abilities/capabilities, needs and circumstances. Although cane training principles are covered in each training program, an individual program is devised, particularly as domiciliary programs make up a large part of this Association's services

The Long Cane Program

i. Emphasis is placed on unaided skill and sighted guide, where necessary

ii. Maintaining consistent levels of cane technique is essential as the aid does not compensate for errors made

iii. Great emphasis is placed on detailed knowledge of routes and significance of landmarks

iv. Feedback regarding Orientation skills is given in more detail by the long cane Instructor in terms of the client's performance with the aid, the use of sensory input and geographical detail on routes - more so than the Guide Dog user

IN CONCLUSION... it is my express hope that one day vision disabled people will be able to readily access accurate information about **all** mobility from all mobility personnel - Guide Dog or Orientation & Mobility. Indeed, the ultimate vision disabled traveller would be one who is competent in **all** aids.

The Tandem Programme for Use with Guide Dogs

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1. What Is Tandem?

Tandem is a method that was developed by our association for using guide dogs. In short, it is a method that allows the use of one guide dog by two people. We have experimented with eight cases thus far, all being couples. Sometimes, the dog was used individually and other times jointly with one partner controlling the dog and the other joining hands (Fig. 1).


Fig. 1

2. Development of the Tandem Programme

The Tandem Programme was first performed in 1985 at a time when we interviewed a man who wished to learn to walk with a guide dog. This person's wife had very low vision and was also interested in using a guide dog. She approached us and asked if it were possible for her to receive instruction along with her husband. However, due to the suddenness of her request, we did not have a dog available for her use. Nevertheless, we felt the need to fulfill her request, and it was at this point that we came up with the Tandem Programme.

At this particular time, most training facilities for guide dogs in

Japan believed that there should only be one specified user per dog. Even now, this way of thinking still seems to be prevalent. This approach, however, requires that visually impaired couples obtain housing suitable to live with two dogs or that one partner give up the use of a dog. In most housing situations in Japan, such conditions are difficult to find. Furthermore, the use of a guide dog by those with low vision has not been given much consideration for the reason that a person would not trust a guide dog while still possessing some vision. Our first experiment with Tandem proceeded without any problems. The dog was not perplexed when handlers were changed but peformed its role properly and willingly.

3. Characteristics of Tandem

Are there special considerations that must be made in the selection of guide dogs, clients, and training with the Tandem Programme?

A. Dog selection

The primary difference between Tandem Programme and the other standard method is that the handler changes often with Tandem.

1) Temperament of the dog :

In the eight cases up to the present, there have been no special requirements above those of the standard method concerning the natural temperament of the dog.

2) Sex of the dog :

There is no significant difference between male or female dogs.

3) Training procedure :

In our training procedure, we have all of our dogs experience different handlers. Furthermore, we believe that the praise given for a correct action should be a dog's reward and a

motivation in taining and that attachment to any particular cilent should not be allowed. We believe that this policy and system are what make Tandem Programme possible.

B. Client preference

Although we explain about the Tandem Programme when a visually impaired couple comes to us seeking guide dogs, we do not disregard the standard method of training. However, while we have had one case up to the present in which a couple used dogs separately, we have not performed such training ourselves from the beginning.

1) Client requirments:

Even with the Tandem Programme, it is necessary to make a suitability evaluation for each user. If all requirements are met, then it becomes a matter of client preference as to which method to use. However, in the case of Tandem, which uses only one dog for two people, it is of course necessary to have alternative means for walking, such as a cane, in the case that the dog can not be used.

2) Class :

In addition to standard walking instructions, the following two items should also be included in the class for the Tandem Programme :

a. Training for the handler and for the person accompanying the handler

b. Training for how to join hands with a handler

4. Survey

We carried out a survey among the eight couples of Tandem users, requesting that each person fill out his or her questionnaire without

cousulting his or her partner. Although we will not take the time to give the details here, to give you an idea, when asked which means of walking was preferred, 11 out of 16 (5 couples out of 8) clearly replied Tandem. We believe that this proves that there is very much significance to the Tandem Programme.

5. Our Observations

When people learn new technology, new worlds are opened to them. When visually impaired persons learn braille, we can say that they have the literature of the world at their fingers tips. When a visually impaired person learns how to use a white cane, maps of the countries from all over the world where they want to go may be sketched in the backs of their minds. New technology changes people's lives and their life-styles, and we believe that a guide dog is also one of those forms of techonollogy.

It may be true that the Tandem Programme is simply an idea that was developed in response to the fact that houses in Japan are small and unsuitable for living with multiple dogs and the fact that a visually impaired person often marries another visually impaired person; however, had we only chose to accept that which had been passed on to us, eight couples of Tandem user would not exist today.

Walking for a visually impaired person is not merely moving around, but is also a question of comfort and functionalism. Considering this and the fact that a guide dog can be a source of much happiness for a visually impaired person, it is our sincere desire that rehabilitation facilities for a visually impaired person and their employees will have increased appreciation for guide dogs.

A consideration of Tactile Tiles and Audible Traffic Signals in Japan

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1. Introduction

In Japan, tactile tiles (TT) and audible traffic signals (ATS) are widely used to assist blind and visually impaired travellers walking alone. Although these have been recognized as beneficial to users, there appear to be many unsolved problems. For TT, these include color and size of individual tiles, patterns of raised areas on tiles, and tactile contrast between bar- and dot-shaped raised areas. Problems associated with ATS include noise impact on the environment, discriminability over ambient environmental noise, and effectiveness as a navigational aid.

In this paper, we will discuss the present situation of TT and ATS in Japan and the necessity of research and surveys of these assistance systems to increase safe and efficient mobility of visually disabled.

2. Concerning tactile tiles

In Japan, tactile tiles which were originally developed by late Mr. Seiich Miyake have been installed since 1965. Mr. Miyake created two fundamental types of tactile patterns: i.e., one was dot tile and

the other one was bar tile. Each of these tiles has a different functional role depending on their raised patterns. The pattern of dot tiles (original tile made by Miyake had 6 X 6 array of round dome-shaped protrusion of 5 mm in height on 30 X 30 cm plate) pattern represent warning or attention, indicating users to search for his/her surrounding environment carefully. Thus dotted tiles are being used, for example, in the corner within tactile paths, in front of staircase, at the edge of train platform, at bus stop etc. On the other hand tactile tiles of bar pattern (Original pattern by Miyake had four parallel bar (about 30 cm long and 2.5 cm in width) that protrude 5 mm from the base plate) form tactile path by which blind or low-vision people walk trailing it. Although TT is basically a very simple system carrying only two kinds of different information as described above, there are many modified patterns and sizes of TT. Configuration of TT path is not consistent as well. To avoid confusion it would clearly be helpful to standardize raised pattern of TT and the shape of tactile path and to do so, some questions about TT have to be solved. Some points on this matter will be as follows.

a: detection of tactile tiles from background (tactile contrast between TT and flanked ground or floor surface)
b: distinguishment of tactile pattern between dot and bar tile (tactile contrast between dot and bar patterns)
c: installation of dot and bar tiles in tactile path (rules that indicate start, finish, corner, branch)
d: tractability of tactile path (suitable configuration of tactile path that make visually disabled pedestrian walk as smoothly as possible keeping orientation)
e: width of tactile path (easy recognition of the direction of tactile path and prevention of stride over)
f: color of tactile tile (because of its use by both blind and partially sighted user)

3. Concerning Audible traffic signals

Audible traffic signals are ubiquitous in many towns and cities in Japan. The first traffic signal for visually disabled was installed in 1964 in Tokyo. This first ATS told users corresponding to phases

"go" and "stop" traffic signal by a ringing bell attached to normal light signals for pedestrian. Thereafter, large numbers of similar kind of ATS have been installed mainly in metropolitan areas of Japan. ATS has been recognized as essential equipment for visually disabled to cross intersection independently and the effect of it function is further strengthened when equipped with appropriately installed TT. Although ATS appears to be useful for independent travel by visually disabled, ATS of present form still does not ensure safe walk across crossroads. Some of the main problem will be as follows.

a: ATS as navigation aid (evaluation of ATS sound as navigation aid from entrance to finish of crosswalk)
b: installation of tactile path on the crosswalk (durability of tactile marker on roadway)
c: introducing new tactile marker to use with tactile path on roadway (to distinguish tactile path between sidewalk and roadway)
d: impact of ATS sound on inhabitants and pedestrians (use of signals other than sound or simultaneous presentation of sound and other signals)
e: possibility of electronic navigation aid usable at crosswalk

4. Consideration

Tactile tiles and audible traffic signals have been developed and distributed extensively all around the country and such an example may not be found in any other country than Japan. This is perhaps due to a need for the blind to walk independently in busy towns and cities in Japan where traffic is very busy yet roads are rather narrow and well developed mass transit networks are also complex. Insufficiency of establishment of human assistance system to help blind and visually impaired to go outside also might take part in this development. In the beginning of TT or ATS installation, there seemed to be some confusion about the use of those equipment by visually disabled, but presently both sighted and visually disabled persons are becoming aware of the importance and function of those equipment better than before. Moreover installation of TT and ATS are considered an essential part to support independent travel of visually disabled.

To date, efficacy of TT and ATS is well recognized and Japanese government and municipal governments recommend that such facilities be installed as much as possible in places where blind or visually impaired would potentially visit. Although installation of TT and ATS is popularized and spread so rapidly, some users seem dissatisfied by the present situation, at least in part. This might result from largely because user of these systems include a variety of skill , physical ability, patience and knowledge and the methods of installation is often different from place to place and time to time. So far research about TT and ATS has not been carried out intensively so that guidelines for installation of assisting facilities to meet demand of users in a variety of places and situations are not well established. To solve the problem, further research and survey about mobility, behavior and mental workload of visually disabled to use present form of TT and ATS will be needed. To establish safe and efficient mobility is an urgent problem in a society whose complexities increase day by day by incorporating modern technology.

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FASTRAK: HOW MOBILITY INSTRUCTORS CAN INFLUENCE THE DESIGN OF A MODERN RAIL SYSTEM

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Fastrak is Western Australia's renamed and revitalised suburban train system. So new that the last section was only opened in August 1993.

The Fastrak system, incorporating three previously existing suburban train lines with 49 stations and a brand new 29km line with eight stations, is very easy for people with vision impairments to use because it was designed deliberately to incorporate special features for their benefit. Blind users are now reaping the benefits of sustained and effective lobbying by my organisation's mobility instructors and the cooperation and willingness of transport authorities to consult with us and incorporate our ideas into the new designs.

We lodged our expression of interest on behalf of blind people right from the early feasibility study stage. Mobility Instructors at the Association for the Blind of WA (Inc) were involved in the design of the new rail system from the very beginning, in 1987. This meant that suggestions could be taken into account at all design stages, which is easier and more cost effective than modifying designs at a later stage. The success of the new system in meeting the needs of our consumers reflects the constant vigilance of mobility staff and our persistence in regularly promoting those needs over a 5 year period.

These innovative features for blind users include:

a) Audible destination voice box on each station called "passenger information modules". It is a large stand alone stainless steel box, easy to find on the station. Inside is a computer and digitized voice which, when activated by touch button, will state the time of arrival of the next train, its destination and the stations it will stop at. The activator button is a large raised square, easy to find by touch.

b) On-board announcements of next station stop and door closings.

c) On-board intercom to the train driver. This facility was incorporated to improve the confidence and safety of people with vision impairments, especially when travelling alone at night.

d) Tactile and colour contrasted pathways and platform edging, and highly reflective raised markers on pedestrian crosswalk edges (outside the stations).

e) Passenger service staff to assist passengers on request.

f) Platform height adjusted to meet the railcar step. This means that people do not have to step down from the carriage to the platform.

g) Glass sided escalators and lifts on platforms. Glass sides allow natural light into the lift and onto escalator steps, improving visibility and allowing people to walk in light, not shadow. Station and carpark lighting systems are photo electric cell operated. Light sensors automatically trigger artificial illumination of stations and carparks if natural light drops.

h) Colour contrasted carriage interiors, including seats, grab rails and floors helps people with low vision to locate the items.

i) Colour contrasted risers and nosings of all steps, so that people with low vision can negotiate them safely.

j) An emphasis on signs which are very clear, high contrast and at comfortable viewing height.

k) Flashing lights, audible signals and gates at all major pedestrian, level crossings. Audible signals and gates at the remainder. The new Northern Suburbs Transit System have no "at grade separated" pedestrian or vehicle crossings.

l) Colour contrasting fittings in public toilets on stations.

m) Station access ramps include kick rails (in addition to hand rails) for cane users to identify the edge.

n) Standardised control buttons in lifts throughout the rail system. Buttons are aligned horizontally for greater control when scanning. Handrails in lifts guide a blind user to the control panel and act as a safety device.

o) White dots on escalator hand rails at one metre intervals. These show people with low vision the direction and speed of the escalator.

p) The level exit and entry at top and bottom of escalators (called "flatbeds") increased to three escalator steps instead of the usual two, that is 1.2 metres. This allows vision impaired people to settle on the tread before the escalator takes them up or down.

q) Lighting on stations is designed to eliminate shadows, even at night. Skylights on many stations make maximum use of natural light.

r) Sound levels on station announcements are adjusted automatically to accommodate ambient noise. The sound system uses many small speakers placed at regular intervals to give uniform, clear sound.

All of these measures mean greater independence and mobility for people with vision impairments using the train system. They can, safely and with confidence, use fastrak on their own. Even if they do need assistance on occasion, the transit system provides passenger service assistants at only an hour's notice, so that the user does not have to rely on relatives or friends to help - thus increasing their level of independence.

This happy interaction has worked the other way. Video cameras included on trains for passenger safety have given blind and vision impaired users a greater sense of security.

As soon as the State Government announced a study of the feasibility of revitalising the rail system by converting the system to electric power from diesel fuel, the Association for the Blind lodged an expression of interest in facilities for people with sensory impairments. The Association then lobbied for meetings between the major government instrumentalities to ensure that the road, rail and footpath systems were integrated and compatible, to achieve maximum ease of use for people who are blind or vision impaired. These meetings achieved a unity of purpose and development throughout the design and construction phases with whichever bodies were involved, to ensure consistency in delivery of special features and simultaneously achieve the following design principles - convenience, safety and comfort.

Several architects were involved at different stages of station design, a number of engineers had to be lobbied over the installation of connecting overhead ridges, footpaths and roadways, and local government bodies were briefed for their contribution.

The resulting new rail system has been highly praised by vision impaired passengers who find it convenient and easy to use with confidence. The outcome proves it is worth putting in the effort.

A NEW PRIMARY AID

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A New primary aid, well that may not be totally true. What I am referring to is a device called the Connecticut pre-cane. This aid was devised by three people who were, Christian J Foy - Mobility Instructor with the Connecticut State Board of Education and Services for the Blind, Diane Kirchner Physical Therapist and Laurel Waple Occupational Therapist. (Journal of Visual Impairment and Blindness February 1991). The aid is quite simple in design, uses relatively cheap and readily available materials.

There are other pre-cane devices in use, aides such as the Hoola Hoop and the Hoople (modified Hoola Hoop). These aids have some negative aspects, the Hoola Hoop proved to be difficult when negotiating doorways, and the Hoople overcame that problem, but still only had one point of contact with the ground. The connecticut alleviates these problems, and from my experience I would say it is an excellent teaching aid, for people not yet able to be trained in the use of a long cane.

Within the area of Mobility Aids for the Blind and Vision Impaired, it has for quite some time been accepted that there are two primary aids. these being the long cane and the guide dog.

The guide dog option has a number of criteria to be satisfied, including age, desire, and circumstances of the prospective user.

The long cane can prove to be inappropriate for a number of vision impaired people for one reason or another. For example, situations where the student does not have or cannot develop, the required fine motor skill to be able to manipulate the long cane, in a manner adequate to

give the necessary feedback, or protection for safe travel.

The negating factor may be a physical one, where the person might be suffering from severe arthritis, and is unable to use the wrist, arm or shoulder to achieve a suitable technique with the long cane.

The stumbling block for the use of the long cane, maybe a case of learning difficulties, where the person is unable to gain the appropriate skills for their needs.

For whatever reason, and I am sure that as instructors we either have, or will encounter situations where neither of the recognised primary aids are a viable proposition. In which case the connecticut could possible become the primary aid.

I would like to present to you a case that, at this time fits the criteria for using a Connecticut as a primary aid.

Tommy is a thirteen year old boy who had both eyes removed due to Retinoblastoma. Paediatric and Psychiatric reports stated that he has developmental and intellectual problems.

He was first seen by an Orientation and Mobility Instructor at five years of age, and proved to be unreceptive to any instruction. The Instructor continued to work with him through his sixth, seventh and eighth years. It was in his eighth year that some improvement in his receptiveness to formal instruction was noted. Techniques of trailing and protection were reinforced and consolidated through his ninth, and into his tenth year. At th age of ten a pre-cane was introduced, (Hoola Hoop) but proved unsatisfactory, at this point a wheeled device was attempted, this also proved unsuitable. Approximately six months of instruction using pre-canes was conducted, after which a long cane programme was initiated. The programme continued

well into his eleventh year, at this point I became involved with Tommy.

His cane skills at this time were very basic, and mostly co-active. Cane skills continued to be reinforced and after six months re-assessed. Progress was negligible, and at this rate the long cane was not going to be, (at least in the near future) a viable aid for Tommy. He was not obtaining protection or information about his immediate environment.

During this period I had been working with some pre-schoolers, using the Connecticut pre-cane. I felt this aid would be more suitable for Tommy, and more beneficial than the long cane. Discussions with the parents followed, but the idea of a pre-cane was a backward step and therefore not worthy of consideration.

This situation prevailed for three months, during which time my observations of the pre-schoolers using the aid, only convinced me more that Tommy should at least be assessed with the use of the pre-cane.

More discussion with the parents, and the introduction at his special school of a wheeled frame for Tommy, gave me the opportunity to gain an assessment with Tommy using the connecticut pre-cane.

The assessment proved successful, and he now uses the aid for moving around the school, walking to and from the school bus and other outings (shops etc).

This use of the pre-cane as a primary aid, does engender a problem with the material used in its manufacture. The P.V.C wears through at the point of contact with the ground surface. To overcome this two aids were made for Tommy, one he would be using and the other being repaired. This proved to be a rather tedious procedure, so various ideas were considered to lengthen the life of the wearing surface. At present Tommy is

using a fabricated steel version.

This problem only arose because this teaching aid is serving a useful purpose as a primary aid.

DEVELOPMENT OF STANDARD WHITE CANE FOR THE RURAL BLIND IN INDIA -- (THE SAATHEE CANE)

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India has an estimated blind population of 13 million, of which 80% resides in villages. White canes in India are primarily designed to meet urban needs which conform to various shapes, sizes and materials. Hence, these are not ideally suited for a wide range of rural terrains. The Ministry of Welfare, Government of India, therefore, assigned the project for development of Standard White Cane for the rural blind to National Association for the Blind, India. The mandate was to design a sterdy, reliable, affordable and presentable cane. This Paper gives various steps taken towards completion of the two and a half year project which concluded in September 1992.

1.1. The project commenced with an indepth study of technical specifications evolved at the National Academy Conference Washington D.C. in 1971 and at Royal National Institute for the Blind, London and the Indian Standards BIS-IS: 11646 - 1986.

1.2. In the mean time, efforts were made to gather various existing canes by either direct procurement or by writing to different blind welfare agencies from selected countries.

2. In all, 49 samples of long, collapsible and telescopic canes were obtained - from Czechoslovakia (3), Japan (10), Sweden (3), USA (1) and India (32). The objectives of

international cane study were:

a. to study various canes and cane-components, their shapes and sizes (Please see 2.1).

b. to examine various alternate materials used in the manufacture. (Please see 2.2).

2.1. The 49 canes were viewed as 12 Integral and 37 Assembled Canes or 19 Folding, 9 Telescopic and 21 Long Rigid Canes.

The components of these canes could be described in the following manner:

Grip: Round (23), Flat (8), Round with Knob (10), with Crook (2) and others (6). Shafts: Parallel (26), *Tapered (6),*Natural Taper (10) and Step Parallel (7). Tips: Hemispherical (30), Conical (6), Flat (7) and Others (7).

(*In case of tapered and natural tapered shafts, maximum top diameter was 28 mm and bottom diameter was 8 mm.)

Similarly, features such as weight, length and colour were also observed and noted.

Considering the various functional requirements of the cane - components,43 prototypes were prepared. These were products of 13 types of grips, 4 types of shafts and 6 designs of tips. These were the initial prototypes.

2.2. The following materials were identified for preparing the components as a sequel to the survey of International Canes and Literature study.

Grip: Cane wood, Moulded Cork, PVC Sleeve, Plastic, Rubber & Sponge Rubber.

Shaft: Aluminium Tube, Bamboo, Brass,

Duralumin,Fibreglass, Fibre Reinforced Plastic, Glass Reinforced Plastic, Plastic, Stainless Steel and Timber.

Tip: Aluminium, Copper, High Density Synthetic Resin.

Loop: Coir, Elastic, Jute, Leather and Rubber.

Coating: Boron, Enamel, PVC Sleeve and Synthetic Resin.

3. These International Canes were subjected to laboratory tests to measure auditory output, vibrotactile output, absorption of moisture, heat/electrical conductivity, rigidity and distribution of weight.

   This exercise was intended to determine the permissible value-range for these critical parameters so that the same could be compared later with similar values obtained for the canes to be developed under the project.

4. Since it was felt that all the materials listed at 2.2 might or might not be available in rural areas, and some of them might add significantly to the cost, it was decided to short-list materials.

4.1. Next a set of timber species recommended by the Forest Research Institute, Dehra Dun and Timber Consultants and those identified through International Cane Study (2.2) were subjected to considerations such as technical suitability, regional availability and cost.

4.2. Similar considerations for materials other than timber were also kept in mind at this stage.

5. At this stage desirability of providing optional components such as jingle, tricycle-bell etc., was examined.

   Views of 76 cane users/O. & M. Instructors were gathered about suitability of these

components. Factors such as additional weight and shift in centre of gravity were kept in mind. The other components like rubber sleeve, castor wheel were dropped because of the difficulty of replacement in remote villages.

Ultimately, only two optional components viz., a loop and a red colour band were selected.

6. On rigorously analysing the features of 43 prototypes (referred in 2.1) and after conducting pilot studies with actual users and O & M experts, these were ranked according to performance. At the end of this procedure in all ten prototypes were selected for field studies.

   These were made of

   7 Grips (Angular, Chisel Handle, Flat, Knuckled, Round, Serrated and Torch shaped).

   4 Shafts (Gradual Taper, Natural Taper, Parallel and Step Parallel).

   5 Tips (Angular, Conical, Hemispherical, Pear Shaped and Shoe-type).

7. In-house evaluation of these 10 prototypes was carried out and the responses noted.

8. The Eight stage witnessed two simultaneous activities.

8.1. Field testing of ten prototypes in the rural blocks of five States of India viz., Gujarat, Karnataka, Maharashtra, Orissa and West Bengal. The 102 respondents who tried these prototypes. They were visited again after six weeks for follow-up studies. The

cane users' views were collected with respect to weight, balance, auditory-output, suitability of components and performance on different types of terrains. These criteria were simulated with suitable weightages and final designs were thus selected.

8.2. Concurrently, local availability of materials and infrastructure for production of canes were studied.

9. At this stage mid-term evaluation of the project was undertaken.

10. Following the statistical simulation referred in 8.1 and infrastructure availability study (8.2), three designs were finally frozen (having square/flat grips, tapered/parallel shafts and conical tip). Simultaneously, the final selection of materials was carried out based on value ranges found in step 3 and the corresponding values of various materials after laboratory tests. It was also dependant on material availability study (8.2).

(Six species of timber and aluminium tube for shaft, timber for grip, mild steel for tip and leather for loop were the materials selected. The six timber species identified are Albizia procera (Safed Siria), Artocarpus Spp. (Jack/Kathal), Gmelina arborea (Gamari), Grevillea tiliaefolia (Dhaman), Grevillea robusta (Silver Oak) and Mangifera indica (Mango).)

11. Cane visibility study was carried out using red bands of 200 mm., 250 mm. and 300 mm. lengths & positioned at the bottom and middle of canes. This was done by testing how quickly the cane was visible to a vehicle driver on a dark night (250 mm red band at the bottom was found to be the effective combination).

12. After measuring stature, sternum height, palm length and palm width of statistically viable sample of 60 persons, anthropometric norms for length of cane and grip and perimeter of grip were developed for Indian race.

13. The three frozen designs, made of the selected materials were sent for laboratory test to find out if values for different

    critical parameters compared favourably with the value ranges determined at step 3.

    This ultimately lead to the development of the standard white cane for the rural blind called the 'Saathee Cane' (T1, T2 and AL). The word 'Saathee' means companion in many Indian languages.

14 'Handbook for Production of Saathee Cane' and 'Infosheet for the Cane Users' were prepared next. Documentation of the findings of the research study was the concluding step.

    300 sample canes were produced for country wide distribution and feed back.

It is hoped that the newly developed 'Saathee Cane' will prove useful in providing safe and efficient mobility to the millions of blind people living in rural India. May be, it can also be used in other developing countries of Asia and Africa with equally encouraging results.

THE ROBOTRON COLUMBUS
IN ORIENTATION AND MOBILITY TRAINING

Patricia Fraser

Robotron Pty. Ltd.

Melbourne, Australia

The Robotron Columbus is a hand-held talking compass. It speaks the four cardinal points, as well as the four inter-cardinal points, in a digitised human voice.

The compass is battery-operated, using two N-sized batteries, which are generally available through photographic shops and pharmacies where photographic supplies are sold.

It has a wrist- or belt-strap, which is designed to give the user instant access to the device while retaining freedom of hand movement.

The compass is operated by pressing the button mounted on the top of the case. As long as this button is depressed, the compass will speak the direction in which it is pointed.

For accurate measurement of the compass direction, the compass should not be more than twelve degrees out of the horizontal plane. Since it can be difficult to guess the horizontal plane without vision, we have devised a technique for establishing the proper position, which can also be used as an orientation method for the user themselves.

The compass is held before the body and the button is depressed, and held down for the whole exercise. When the button is first depressed, the user will hear the compass saying a direction like "South-West". The rest of this

technique works most clearly when the user is facing East or West - other directions will give some confusing results.

First, the vertical position must be determined. If the user inclines the compass so that it is pointing more in an upwards direction, the magnetic influence will change and a new position will be announced: in Australia and other Southern Hemisphere countries this is usually North added to the real direction, while in the Northern Hemisphere it is usually South. If the user then lowers the point of the compass so that it passes through a central, outward-facing position, another position will be announced, corresponding to the first position heard. The user should keep lowering the point of the compass until it is pointing floorwards, where a third position should be announced - the opposite, usually, of the upwards position. It's possible by going through this to establish the centre position and to orient the compass on this.

Now the horizontal position must be established. This is done by moving the compass in an arc horizontally - either by moving the arm or by moving the body. For some users, moving the arm may be more disorienting than helpful, particularly if they are in danger of losing the vertical orientation already established - in this case, it may be better to swing the body slightly to the left, then back through the centre position and to the right. This will establish three positions from which the user can orient on the centre.

It may also be that for some users it is more effective to orient horizontally and then vertically - this sort of assessment is much better done in the field by the mobility professional!

Environmental awareness

As you have seen from the position-finding demonstration, the directions spoken by Columbus give the user information about the abstract environment, and their place in it. This is not meant to supersede other forms of environmental awareness, but to supplement it, as would the use of any compass. What we hope is that, by using a compass which interferes less

with normal travel and orientation, the user can fit compass awareness seamlessly into their total mobility skills.

Independent movement skills

We have also found that the Columbus gives supplementary feedback to the user to assist in the development of independent movement skills

- for dynamic posture: the compass direction spoken will deviate when the student holds the compass differently, thus showing the moving relationship of one body part to another. This information can be useful to trainer and trainee for reinforcing other methods of establishing bodily awareness.
- for straight-line maintenance - as the user's path deviates, so does direction spoken by the Columbus. Again, this feedback can be used for reinforcement, although the deviation caused by elevation or depression of the "nose" of the compass must be taken into account during exercises of this type.
- turns can be followed dynamically using the Columbus. This is particularly useful in reinforcing 180º turns.
- squaring-off can be reinforced using the ninety-degree angle between cardinal points.

Compass Training

Columbus was initially designed as an aid to understanding cardinal and inter-cardinal compass points and their relationships. Since using a standard compass or a Braille compass can actually interrupt the flow of training and may disorient the new trainee to some extent, it is possible that Columbus may be able to be fitted seamlessly into standard training regimes without interfering markedly between trainer and trainee.

All the standard benefits of using a compass and compass directions can be derived from using the Columbus, both in mobility training and in normal daily mobility:

- Personal orientation and environment monitoring
- Route layout and description
- Description of line of travel
- Establishment of landmarks
- Explicit directions over large distances
- Systematic maintenance of orientation
- Formulation of relationships between points
- As an aid to self-familiarisation in an unfamiliar environment

General Use

General mobility use of the Columbus, particularly following its use in orientation & mobility training, should be simple for the user, not requiring any great effort after initial familiarisation.

We would recommend that the strap is used so that the compass rides outside the user's clothing: first, for easy access when it is needed, and second, so that the button is not kept depressed accidentally, causing the batteries to lose charge.

If the Columbus is to be shipped or stored, we recommend that the batteries be removed and packed separately. Batteries should be replaced if the voice begins to distort or to lose volume.

Columbus will be available world-wide from the middle of February, 1994. Since we are using digitised speech, it is a relatively simple matter to make the compass available in any language

The Significance of Vision in the Mobility of the Partially Sighted: A Research Challenge

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The majority of people who have a vision impairment have some residual vision (Genensky, 1976). Clearly residual vision must be useful to orientation and mobility, however we do not fully understand in what way. The relationship between residual vision and mobility was first studied in the early 1980s. Marron and Bailey (1982) found a poor correlation between visual acuity and mobility performance, whereas spatial contrast sensitivity and visual field measures explained respectively, 33% and 30% of the variance in mobility. Subsequent studies (Ross, 1983; Brown et al, 1986; Lovie-Kitchin et al, 1990; Long et al, 1990) have been unable to explain a greater proportion of the variance in orientation and mobility performance. The principle differences between the studies have been the methods used to measure mobility performance, the measures of vision, and the nature of the mobility task.

MOBILITY

Contrived mobility courses have been utilised in most studies investigating the role of residual vision in mobility (Guest, 1980; Brown et al, 1986; Lovie-Kitchin et al, 1990). Others have combined performances on indoor courses and more natural outdoor courses to give an total mobility index (Marron and Bailey, 1982; Long, Reiser and Hill, 1990). It is improbable that very specific tasks, such as navigation through a contrived indoor course, walking along a quiet residential street or negotiating a crowded shopping area, are representative of over-all orientation and mobility performance. The demands of different mobility tasks are as different as the aspects of vision that are most likely to be useful in accomplishing them. In fact, Marron and Bailey (1982) found a poor correlation between indoor and outdoor mobility performance.

VISION

Usually vision is measured in a consulting room. There is a significant difference in illuminance levels between an indoor consulting room and the outdoor environment; a difference of nearly 2 log units between indoor and outdoor measurements. Between these levels of luminance there is only a slight improvement of visual acuity for people with normal vision, but significantly different measurements of visual acuity for those with vision impairment. In a group of sixteen subjects with various ocular pathologies, Lie (1977) found large individual differences in the dependence of visual acuity on luminance and contrast.

Thus it would be difficult to correlate the indoor measurements of vision and outdoor mobility performance of the partially sighted. Vision measures should be recorded under the same conditions of illumination as the mobility measures, in order to understand the relationship between the two. Brown et al (1986) considered the relationship between vision and mobility, both measured indoors, in a group of subjects with Age Related Macular Degeneration (ARMD) at scotopic, mesopic and photopic levels of luminance, however there have been no studies hitherto which have attended to vision and mobility at outdoor levels of luminance in subjects with vision impairment.

For reasons of convenience and tradition, vision performance is measured by visual acuity. Whilst it is a very useful measure, visual acuity merely represents a part of the function of the human visual system, and is therefore likely to correlated with mobility, but unlikely to explain a large proportion of the variance in mobility performance. Marron and Bailey (1982) and Long, Reiser and Hill (1990) found very poor correlation between visual acuity and orientation and mobility performance, whereas Brown et al (1986) found a high correlation. This discrepancy requires explanation.

The contrast sensitivity curve provides a fuller representation of the ability of the human eye to detect objects of different size and contrast. Marron and Bailey (1982) found that the peak of the contrast sensitivity curve correlated most highly with mobility performance. The Melbourne Edge Test (Verbaken and Johnston, 1986) and the Pelli-Robson chart (Pelli, Robson and Wilkins, 1988) are clinical tests of peak contrast sensitivity. The utility of these tests as predictors of functional mobility performance need examination because they are convenient and simple to administer both in the clinic and outdoors.

Several experiments have shown that the extent of the total visual field has a strong correlation to orientation and mobility performance (Guest, 1980; Marron and Bailey, 1982; Ross, 1983; Brown et al, 1986; Lovie-Kitchin et al, 1990; Long et al, 1990). Further, Lovie-Kitchin et al (1990), correlated mobility performance with fifteen separate subdivisions of the binocular visual field. The most important areas were the central 37 degree radius zone and the right, left and inferior mid-peripheral zones. This is contrary to the view of clinicians that the far periphery is most important for mobility. Whilst Lovie-Kitchin et al (1990) found that the central and mid-peripheral zones were the most important predictors of mobility performance on an indoor static obstacle course, the far periphery may be more important to travel through a crowded shopping mall. Depending on the mobility task, one area of the visual field may be more critical than another.

Thus far, clinical measures of vision have been designed with an emphasis on detection of pathology. We take measurements of threshold levels of vision ability, whereas the visual cues involved in orientation and mobility are supra threshold.

For example, large, moving contours in the environment must be useful in self-motion, yet our current perimetric techniques use small, slowly moving or even static targets, which probably results in the underestimation of amount of visual field contributing to orientation and mobility. Similarly, low contrast (10%) letter charts have their place in detecting subtle signs of pathology, but are not relevant to functional mobility performance because the environment contains objects of higher contrast. More consideration needs to be given to vision tests which reflect the nature of the functional task.

HOW SIGNIFICANT IS VISION TO THE MOBILITY OF THE PARTIALLY SIGHTED?

Given the same vision impairment, it would be reasonable to expect that the mobility performance of individuals is similar. On the contrary, with identical degradation to vision via simulators, Haymes, Guest, Heyes and Johnston (submitted 1994) found large between-subject variation in mobility performance. Brown et al (1986) also reported large individual variation in mobility performance amongst a group of subjects with ARMD. Some individuals with severe visual deprivation attack a mobility task with alacrity, whilst others with moderate vision impairment are fearful for their safety and refuse to attempt it. Thus, the interpretation of danger and acceptance of risk could influence mobility performance more than the extent of the vision impairment. Clinical measures of vision have only accounted for a small proportion of the variance in orientation and mobility performance, personality factors may explain a larger proportion of the variance.

CONCLUSIONS

Well-controlled indoor mobility experiments have provided an understanding of the relationship between residual vision and mobility performance, and yet have little to do with practical mobility tasks. The time has come to apply the information assimilated from indoor mobility experiments, to real world experiments done out of doors, so that the findings may benefit the rehabilitation of people with vision impairment.

The clinical measures of vision that we are interested in are those which reflect the visual cues pertaining to functional orientation and mobility, and are convenient and simple for the clinician to administer. Tests of spatial contrast sensitivity, such as the Melbourne Edge Test and Pelli-Robson chart should be considered. Likewise, a simple visual field test that predicts functional mobility performance would be useful for clinicians. Investigations should centre on validating a variety of functional binocular visual field tests, with appropriately apportioned weightings, for various types of mobility tasks.

For clinicians to be able to predict the benefits of rehabilitation for a client with vision impairment, we need to achieve a fuller understanding of the key variables

involved in orientation and mobility performance. Various measures of vision merely explain one third of the variance in orientation and mobility performance. We do not know which variables explain the remaining two thirds of the variance. The obvious difference in coping strategies employed by individuals with vision impairment has been given insufficient attention. The differences may lie in their utilisation of residual vision, their ability to process visual and secondary sensory stimuli and subsequently construct an environmental schema, or in personality factors.

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FIELD ENHANCING DEVICES

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Patients with constricted fields of less than or equal to 10 degrees in diameter (retinitis pigmentosa or glaucoma patients) are best suited to the concept of minification. Both of these diseases are very slow progressive diseases and have some psychological aspects such as always knowing the next day their vision will be ever so slightly worse than the day before.

Ideal patients with tunnel vision would have good central vision 20/20 visual acuity would be desirable. However, patients with 20/60 or better can still gain some of the benefits of the minifiers.

Patients with small fields of 2 to 10 degrees in diameter are best able to be helped with minification. Patients with less than 2 degrees don't often appreciate increasing their fields to 3 degrees. Patients with greater than 10 degree fields usually do better by using scanning techniques without minification.

Hand held minifiers used on a part-time basis will be discussed first. Hand held minifiers are used primarily by persons when they first come into an unfamiliar room to scan that room with the minifier. Then they would remove the minifier and make their way with normal scanning techniques. One of the methods of minification is to use a reverse telescope. Ideally this should have a low power an example would be a 2.5X telescope. This can also be turned around and used as a telescope especially for patients with visual acuities of 20/40 to 20/60 where they could use the magnification as well as the field enhancing aspect of the minification. An afocal telescope is used. Therefore, they

use the distance correction of their bifocals.

A minifier is essentially a reverse telescope that has been optically corrected to minimize optical aberrations. Usually 0.68X minification (less minification than a reverse telescope) is used. There is only a small reduction in visual acuity. This will still increase the field by 50%. It is also afocal. Therefore, the patient should use their distance correction.

Many people who have looked at the world through a doorviewer have thought of using this for patients with tunnel vision. It has 0.21X minification which minifies dramatically. The only problem with the door viewer would be that it reduces the visual acuity too much. A 20/20 patient would see only 20/100 through the door viewer.

The minus lens held in front of the patient can also be used as a minifier; a -6.00 diopter to -18.00 diopter lens held 25 to 40 cm before the patient's eye would be the most common technique. Even a -6.00 diopter lens can have a copius amount of minification. Two examples would be : 0.67X minification from a -6.00 diopter lens held at 9 cm before the spectacale plane with a +4.00 diopter add and second, 0.11X minification from a -18.00 diopter lens held 44 cm before the spectacle plane with a +2.00 diopter add.

Divergent light entering the eye even from a distant target must be focused before the patient's eye, either by accommodation or by use of the bifocal portion of their spectacles.

The spectacle mounted minifiers are another possibility and can be used on a more full-time basis. There are a few individuals that will use these for mobility. These would be designed to wear on a more full-time basis. Full field minifiers will come in powers of 0.77X, 0.59X, and 0.45X minifica-

tion. This minifies in both the horizontal and the vertical meridians.

The Amorphous lens comes in powers of 0.83X, 0.71X, 0.63X, and 0.56X minification. The Amorphous lens minifies only the horizontal meridian. Since our world is set up in the horizontal direction, most scanning techniques are needed horizontally and minification in this meridian can be of great benefit. However, the vertical meridian is left unchanged and allows the patient to retain a good visual acuity for letters. One main advantage of the Amorphous lens is that everyone they look at appears much thinner than they really are.

A small sample of three individuals that were wearing a spectacle mounted minifier for essentially full-time wear, about three to four hours a day, have discussed their advantages. One of the main advantages would be that a five degree field was changed to 14 degrees when one would expect it only to be increased to a 6.5 degree field with a 0.77X minifier. The only way one could explain this is that they were more aware of their surroundings and therefore used better scanning techniques with the minifier than without it. They were able to see a full doorway rather than just seeing a partial doorway and possibly bumping into a door that was only halfway open. They were able to traverse through supermarkets with less mishaps. They still used long canes for faster mobility. They would have an increased depth of focus. One patient even had an unexpected social advantage. Before he didn't have any different looking low vision aids so he looked like a normal patient. Now he has a low vision aid that looks quite different so people can believe him when he tells them he is a low vision patient.

The obvious disadvantage would be the visual acuity of 10/32 was changed to 10/40- as expected with the full field minifier. As

discussed before the Amorphous lens would only reduce the visual acuity to 10/32-. A less distinct picture of the world would be seen. Almost all low vision practitioners have to be optimistic so that we try to turn this to an advantage. The people that they are looking at since they would have a less distinct picture of the world would have less wrinkles. Another disadvantage of the spectacle mounted minifier would be that patients must turn their heads while scanning. The weight is a definite disadvantage and can somewhat be alleviated with an elastic headband. The depth perception is dramatically changed. Therefore, if they are used to doing carpentry without the minifier and then use the minifier while hammering a nail they are more likely to hit their thumb.

The closed circuit television can also be used for patients with glaucoma and retinitis pigmentosa. The main advantage is the increased contrast. It should be used with the least amount of magnification. The patients may still need to sit back to increase the field. They may even use a minifier with the closed circuit television to increase the field so that they may take advantage of the increased contrast.

I saved one of the easiest and probably one of the most effectve minification devices for last. That is the determining the bifocal add. Prepresbyopes will do fine if they can set their own reading distances. Their reading distances would usually be close to arms length so that they can increase the size of their field.

Presbyopes are not quite as lucky because the Doctor is the one setting their reading distance. I would recommend prescribing the <u>lowest</u> power which allows adequate acuity for normal reading. Patients with 4.00 prism diopters (2.3 degrees) will have a 2.0cm viewing area with a +3.00 diopter add. Those same patients will have a 1.3 cm viewing area with a +2.00 diopter add.

Association pour les Personnes Aveugles ou Malvoyantes

COLOURED LENSES IN ORIENTATION AND MOBILITY

Philippe Aymond

APAM (Association for Blind or Low Vision People)

Paris, France

One of the disabling factors of travel of the visually handicapped population is situated on the level of contrast perception and in the handling of blinding factors.

The use of coloured glasses integrated in a rehabilitation program of mobility training has the objective to improve visual comfort and performances.

This approach, put into use three years ago in the Rehabilitation Centers of MARLY-LE-ROI (APAM, France) allows us to outline certain tendencies.

I - Indications of when the use of coloured filters might be necessary

Certain troubles observed during evaluation of the clients visual potential may indicate the necessity of testing with coloured filters.

Principal indications :

- a bad perception of relief, of obstacles more or less contrasted

- blinding factors or photophobia in day or night situations

- a too long time-lapse necessary in order to adjust to important changes or repeated changes of light intensity (passages from sunny to shady areas).

These tests may be indicated for all situations of travel and for all light conditions.

APAM - 3, rue Jacquier - 75014 PARIS - Tél. : (1) 40 44 88 00 - Télécopie : (1) 40 44 67 75

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II - The approach

It is important to proceed with the testing of coloured filters in static and dynamic situations.

No specific colour is imposed at first, the concrete situation of travel will permit to establish the choice of colour and its intensity.

The tests must show if a particular color can improve perception and/or identification of elements in the environment (steps, stairways, curbs, blocks).

III - The results

The benefit gained varies according to the subjects and the pathologies.

- The dimensional and obstacles perception :
  certain visually impaired persons will remarkably improve this type of perception ; the obstacle detection is more precise and can be brought about at a much longer distance.

- The blinding factor :
  A maximalisation of the visual potential can be reached by seeking a compromise between protection and visual detection.

- Visual comfort :
  For certain subjects the benefit will be situated on the level of a feeling of ease and the speed of travel.

- The use of means of compensation (hearing, cane technique) :
  The use of filters may limit the use of compensational techniques, the greatest visual potential having been acquired (the cane might be used less often).

The benefit of this approach may thus be subjective (comfort) and/or objective (precision of detection) and may vary greatly from one client to the next.

IV - The types of filters and their uses :

The material used consists of a range of coloured filters, as follows :
- brown
- grey
- green
- yellow
- ORMA RT (a brown-orange tint) initially prescribed for subjects suffering from retinitis pigmentosa

Other colors are in the process of being tested :

- the CORNING glasses which present several colors, from yellow to brown-orange

- the LUNIOR and KYROS, (Essilor) which situate themselves in the range of yellows.

These last three colours have only been tested rather recently, so we cannot take these into account for this research.

With most of the colours that have been used, several intensities (A, B, C) have been tried, and also a type of glass that shades off gradually.

Now I am going to show you an analysis of the prescriptions of filters that have been realised on a population of 69 visually impaired persons. These clients were enrolled from 1991/92 through mid-93 in the Rehabilitation Center at MARLY-LE-ROI (which is part of the APAM structure directed by Dr. CHAMBET).

The population studied is constituted of 37,7% of subjects suffering from retinitis pigmentosa and of 62,3% of persons who are suffering from other pathologies (glaucoma, diabetical retinopathy...).

On the total of this population we notice a percentage of 57% of prescriptions of filters, which is important, with 91% of ORMA RT colour.

If we analyse these two cross-populations, retinitis pigmentosa and other pathologies, we can find these diagrams :

* For the population suffering from retinitis pigmentosa we notice a percentage of 56% for prescriptions of filters only in ORMA RT, with 60% of glasses that shade off gradually

* For the population suffering from different pathologies, we notice a number of prescriptions more or less identical to the other group, which means 55,5%

We always find a large majority of 84% of ORMA RT glasses, and 8% of prescriptions for each of green and grey colours.

This analysis reveals an important percentage of prescriptions of coloured filters for Mobility, with a very important number of ORMA RT colour.

As to these prescriptions, we find a considerable proportion of glasses that shade off gradually, almost 60% for the whole population.

This choice can be explained by the fact that these glasses (dark on the top, light on the bottom part) filter more on the level of the light source than on the level of the ground.

What is more, according to the position of the head and the eye-sight level the visually impaired person can choose the intensity of the filter used.

V - Physical analysis of the Coloured Filters used

(Pr. MENU, Doctor in Medicine - Professor in Physiology)

If we consider a simple situation of vision : a curb of a side walk (or footpath) with a yellow border, and we measure the coordinates : brightness, colorimetric coordonates-contrast, with and without filters, we find measures which make possible to infer the following analysises :

.../...

We notice that we play simultaneously on several factors : the brightness and the contrast, which renders any kind of methodology difficult.

We know that the yellow-orange colours cut the blue rayons which are the most energetic and so more dangerous for the retina, thus it is normal that they are the most functional.

The yellow colour of medium intensity, which limits to a minor extend the brightness (important troubling factor) is then not functional on this level, although it creates the best contrast value.

Meanwhile it appears interesting to proceed testing with a yellow colour of strong intensity in order to limit the brightness factor.

We notice slight differences in the CORNING 550 and ORMA RT colours, in only that each is more performant than the other, either in the brightness factor or on the level of contrast. The ORMA RT, more often prescribed, seem to indicate a functional preference on the level of a lowering of the brightness factor compared to the increase in contrast.

Looking at these analysises, it would seem interesting to continue this research by trying to dissociate contrast and brightness or, at least, to know which is the factor primarily touched according to the filter used.

VI - Conclusion

This study is a first approach revealing the funtional interest represented by the prescription of coloured filters for mobility. In fact, these filters are the rare tools which allow us to modify certain parameters of the environment, contrary to the rehabilitation of near vision, which may deal with the light and the contrasts of reading.

Currently survey with a very specific protocol is being elaborated to strengthen this approach in order to render it more performant anc to render the material less constricting.

In the future we can hope to have the use of series of tests specific to mobility, permitting us to determine rapidly which type of filter would be best adapted to each visually impaired person.

We insist on the fact that the use of coloured glasses, associated to the approach of D. F. V. (Development of Functional Vision) is not a trivial matter for a visually impaired person, because it represents an important psychological and "technical" evolution.

In fact, on one hand the limits of visual potential are dealt with, and on the other hand, the use of any material may provoke an exagerated hope compared to the eventual results.

So the use of coloured glasses is part of the approach of the D. F. V., and must be, as such, handled with care by the Mobility Instructor and by means of a pluri-disciplinary team, in order to be able to exchange all information necessary for a well adapted rehabilitation.

ORIENTATION AND MOBILITY:
A Revolutionary Approach

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This paper introduces the reader to "Managing the Low Vision Orientation and Mobility Process", a book being written by the staff of the Western Blind Rehabilitation Center (WBRC) and being published by the Blinded Veterans Association. This book is the result of 25 years of information gained by Orientation and Mobility (O&M) personnel in conjunction with Low Vision and Optometry personnel. Since 1967 the WBRC has served over 3,500 legally blinded veterans. Today, with 90% of all admissions to the Western Blind Rehabilitation Center from veterans with low vision or who are partially sighted, the O&M staff have developed a comprehensive low vision orientation and mobility program to meet the needs of these individuals. It is for these low vision individuals as well as the over 500,000 severely visually impaired (those unable to read news print) individuals nation-wide that this book is intended. Unfortunately, all to often the needs of these low vision individuals go unidentified and unmet.

Many Orientation and Mobility programs treat the partially sighted as they treat their totally blind clients: they are trained under blindfold, taught how to travel utilizing skills and techniques developed for totally blind travelers, and are expected to incorporate and use these techniques when the blindfold is removed.

Antiquated beliefs such as preparing the partially sighted for total blindness whether or not the eye condition is progressive... teaching the development and enhancement of the other senses to compensate for vision loss...and simulating night travel skills for individuals with "night blindness" falls woefully short of meeting the comprehensive orientation and mobility needs of the

partially sighted individual. The partially sighted are just that, PARTIALLY SIGHTED. Why teach strategies and skills developed for the totally blind traveler? Why lump individuals with low vision into the same category as individuals with no vision?

It has been found that low vision clients taught under blindfold revert to relying on their remaining vision when the blindfold is removed. In addition, long cane skills, based on a postural reference system, for example, the hand centered two point touch cane technique, have been found to deteriorate because visual information overrode the tactual information of the cane resulting in unsafe and inefficient travel.

Many low vision individuals trained using the hand centered two point touch cane technique began modifying long cane techniques to meet their travel needs. Their cane hand moved from the center of the body off to the side, their arcs became more and more narrow, the cane tip was held dangerously high, and their visual posture became markedly downward. In short, they were using their vision as a travel aid.

Through observations and functional evaluations as well as through the consensus of returning veterans requiring retraining, the O&M staff at the WBRC identified numerous dangers and travel risks of the low vision individual based on their self developed, refined and adapted skills and techniques. As a result, the O&M staff developed specific skills and techniques to meet the needs of the low vision individuals. These strategies not only emphasized the efficient use of vision, but also took into consideration the consumers stand point and realized that the accent had to be on the acceptable. The individual had to find the strategies acceptable or they would be modified, self adapted or worse, use of the cane would be discarded. Therefore, the low vision orientation and mobility program developed is one that presents the patient with a balance of visual travel options that factor in risk and chance while maximizing visual efficiency in terms of minimizing travel frustrations.

This comprehensive low vision orientation and mobility program emphasizes a systematic methodological approach to identifying and instructing the low vision individual. It permits the Orientation and Mobility Specialist and the client to work as a team to arrive

at a functionally safe travel program specifically tailored to the client. This low vision orientation and mobility process adds direction, structure and clarity to what often seems to be a nebulous task of identifying and treating the needs of the low vision individual. It helps identify, even in the best of low vision travelers, some of the more subtle visual and mobility problems which, if left untreated, can result in risk of injury to the client. This comprehensive low vision O&M process stresses the importance of not over prescribing skills and techniques that are befitting totally blind individuals.

This book will take Orientation and Mobility Specialists step-by-step through the low vision orientation and mobility process from evaluation through training. It will provide detailed information on: Interpreting and applying clinical optometric evaluation results, identification of functional mobility strengths and weaknesses found during evaluations, selection and introduction of cane skills, specific functional visual skills and techniques used to maximize near and distant visual capabilities, in-depth instructional strategies for locating pertinent visual travel information, analysis of intersections from a visual standpoint as well as how to combine and integrate visual skills, optical devices, cane skills, awareness skills and conceptual skills to meet travel goals utilizing the "least risk" approach. Additionally, information on night travel and training, glare control, store travel, use of wheelchairs by low vision individuals, low vision orientation and mobility in a community setting, and self-efficacy and freedom of choice in low vision orientation and mobility clients will be discussed in-depth.

In the past, our field has tended to measure the standard of mobility functioning of low vision individuals against the standards we developed for totally blind individuals. We assess line of travel, obstacle avoidance and veering during street crossings. But, when vision is the main travel modality, we need to asses it in terms of efficient visual functioning, maximum visual distance recognition abilities, visual posture, effective environmental scanning and concept awareness. In short, we need to change the standards we have set and begin to compare the individual with low vision to the fully sighted individual.

This is a revolutionary idea, but one whose time has come. With the large numbers of individuals with low vision needing orientation and mobility services, it is unfair and inefficient to employ a mobility program developed for non-visual travelers. We must provide low vision individuals with a curriculum to meet their specific needs. "Managing the Low Vision Orientation and Mobility Process" a book expected for release in late 1994 will teach orientation and mobility specialists about the comprehensive low vision orientation and mobility process. This process has been found to meet the orientation and mobility needs of the adult low vision individual and it is hoped that it will benefit low vision individuals of all ages.

Low vision orientation and mobility, a revolutionary approach.

For more information about "Managing the Low Vision Orientation and Mobility Process", please contact:

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THE EFFICACY OF ECCENTRIC VIEWING AS A REHABILITATION STRATEGY FOR PATIENTS WITH AGE-RELATED MACULAR DEGENERATION.

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Age-related macular degeneration (AMD) is a major cause of legal blindness in many countries including Australia (Accardi et al 1985, Banks & Kratochvil 1986,Vinding 1989 and Yapp 1989). The visual characteristics of sight loss associated with AMD include significant reduction in visual acuity and loss of the central field of vision. This sight loss impacts on a persons ability to perform many daily functions such as; reading, driving a motor vehicle and the ability to recognise faces (Mitchell 1985). Loss of ability in these areas of function will result in a loss of independence. A number of studies report the impact of sight loss on independence, quality of life and psychosocial well being (Oppegard et al 1984,Gillman et al 1986, Stuen 1990 and Chalifoux 1991).

The impact of the sight loss caused by AMD can be ameliorated with appropriate rehabilitation. A range of optical aids are available to provide magnification as described in standard texts such as Mehr and Freid 1985 and various devices are available to assist with the performance of tasks of daily living (Dudley 1990). Eccentric viewing training provides a strategy to assist persons who have lost the central field of vision to relocate fixation and maximize the use of peripheral vision. A range of training techniques are available to teach eccentric viewing (Goodrich and Mehr 1986), reports of the implementation of these techniques indicate a range of success (Carman-Merrifield1990, Culham et al 1990 and Fitzmaurice 1991)

Eccentric viewing training has provided a successful rehabilitation strategy for clients who are legally blind as a result of AMD attending the Visual Rehabilitation Clinic, La Trobe University. This paper presents the impact of training on levels of near visual acuity and the responses to the post training evaluation questionnaire of these clients.

Subjects: 29 clients who are legally blind and diagnosed with AMD. Ranging in age from 61 to 92 years, mean age 73.8 years.

Procedures: Pre training all clients are assessed for near acuity (Curpax near acuity test); distance visual acuity (Snellen chart) and field of vision (one metre Bjerrum screen). The Bjerrum is performed with the smallest diameter white target the client is able to see (Range 2mm to 15mm average 7mm). The eccentric viewing point is determined by the Orthoptist based on the results of the Bjerrum screen. The area of peripheral retina closest to foveal vision irrespective of direction is chosen. The client is then instructed to move the eyes into a position of gaze which will align the eccentric viewing area with the object of regard. Post training all clients were reassessed for near visual acuity and most clients completed a post training questionnaire.

Eccentric viewing training: Prior to the commencement of training the goals expected from training were discussed with each client. The training program structure consisted of exercises to provide a method to locate the chosen eccentric viewing position combined with practice exercises to consolidate the eccentric viewing technique. Location exercises consist of the client looking directly at a target, which is then unseen and moving the eyes into the selected position of gaze until the target becomes visible. Practice exercises continue this principle using targets of increasing complexity and decreasing size. The targets used as a stimulus during training commenced with playing cards using the number or suit as the target, followed by letter cards, word cards, word lists and finally text material. The number of sessions spent on training varied between clients the minimum being 1, maximum 44 and mean 16. Each session was of one hour duration. The only optical assistance provided was correction of refractive error and presbyopia.

Results.

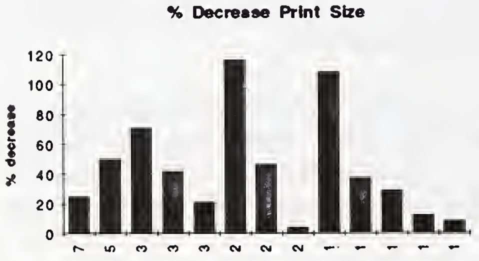

Figure 1

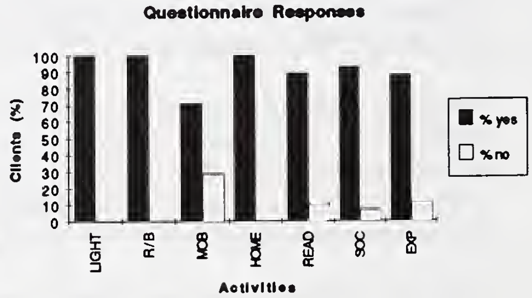

Figure 2

Figure 1 describes the percentage decrease in near visual acuity achieved by each client. Pre training near acuities ranged from N70 to N8 (N70 being a default indicator for clients unable to read N48 the largest near print available). The mean near acuity pre training was N36. Post training near acuities ranged from N36 to N5 with the mean being N16.

Figure 2 describes the client responses to the post training questionnaire. Clients were asked to comment whether they believed eccentric viewing training had assisted them with reading; mobility; the ability to perform tasks at home; and in a social setting. They were also asked if the lighting and reading boards made available during training enhanced the use of residual vision and if they considered the opportunity to discuss their ocular problem was of value. All clients who completed the questionnaire responded that the lighting and reading board were of assistance and that eccentric viewing had helped them to perform tasks in the home. The majority of clients believed that explanation of the eye problem was of value (90%) and that training had assisted them with reading(90%), mobility(70%) and in social settings(95%).

Discussion.

Of the 28 clients presented all demonstrated a reduction in near print size. Eighteen of the clients completed the post training questionnaire, the majority of these clients perceived the training to be of assistance to them with mobility, reading and in social settings. The majority found explanation of the eye problem to be valuable. All respondents believed that additional lamp lighting and the reading boards made available during training were of assistance to them and that training had improved their ability to undertake tasks in the home.

Not all clients completed the training program, of the ten clients who did not complete the post training questionnaire three lived in country Victoria and were unable to attend the clinic on a regular basis to undertake the training program. Two clients living within the Melbourne metropolitan area had transport problems and were unable to continue with training. Three clients became ill and were unable to complete training, one client did not return following an extended holiday and one client withdrew as she had become frustrated with her loss of reading ability. All of these clients had achieved a reduction in near visual acuity however, the data does not indicate whether clients who gained some improvement in near visual acuity from an incomplete program of eccentric viewing training would find the same perceived benefits in the areas of daily living as those who completed training.

The clients presented in this paper who completed training appear to have gained benefit in a range of skills which will contribute toward maintaining independence. These clients attended between five and thirty seven hours of training with 64% of the clients attending more than ten sessions. Time spent on training may be an important factor in gaining the benefits demonstrated by these clients. However time taken to complete the program must be balanced against the cost saving of maintaining the independence and well being of the individual. A further study is being planned to assess these factors.

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CARE FOR PERSONS WITH ACQUIRED LOW VISION

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Introduction

Care for persons with low visual ability in Japan has lagged behind international standards. For example, with regard to visual field defects due to retinal detachment, constriction of the visual field as in retinitis pigmentosa, hemianopsia as with brain tumors, or central scotoma due to central degeneration.

Thus, there is a need for precise and detailed examination of people with low visual capacity by ophthalmologists. Appropriate visual aids must be made available to compensate for poor vision, and techniques of daily living (TDL) instructors should provide adequate instruction so that people may cope with poor vision in their daily lives. Cooperation between ophthalmologists and TDL instructors is imperative.

Aichi Association for Visually Handicapped (AAVH)

The International Year of the Handicapped was initiated in 1981. It was due to this that I was able to establish the Aichi Association for Visually Handicapped with the support of the Medical Doctors Association in Aichi Prefecture.

Until then, there were no medical facilities for ophthalmological rehabilitation. The AAVH seeks to assist persons with acquired visual handicaps and those with poor vision, as well as the totally blind, to acquire skills in daily living, including how to walk and obtain medical care as needed. It also teaches volunteers and family members how to help the visually impaired.

Another goal is to prevent blindness.

It is necessary to study the causes of blindness to prevent its occurrence, and since 1982, I have studied the causes of those diseases of visual disability in Nagoya city. According to statistics, diabetic retinopathy is the main disease for all visually

handicapped. Second to that has been retinitis pigmentosa.

The AAVH now has about 350 members. It is able to continue its many activities thanks to the dedicated services of two walking instructors and close cooperation with ophthalmologists, physicians, otologists, nurses, medical social workers and a team of fifty volunteers.

AAVH activities

AAVH activities may be divided into the eight courses it provides:

1. Guidance for the visually handicapped
2. Instruction in daily living skills
3. Walking with a white cane
4. Walking with the aid of electronic devices and /or a guide dog
5. The use of instruments for those with low vision
6. Contacts with the blind or others with low vision
7. Personal communications
8. Large legible printing for those with low vision

Communication between AAVH and ophthalmologists in Aichi prefecture

Since 1989, there has been support for the AAVH by the Association of Ophthalmologists in Aichi Prefecture. From its foundation, some 600 ophthalmologists have become aware of how to take care of visually handicapped people when encountered at the treatment level. Whenever an ophthalmologist's diagnosis of a patient is low vision, the patient will be introduced to the AAVH to obtain ophthalmological rehabilitation.

The many different findings for low vision people

The findings of low vision show such varying degrees of severity it is impossible to compile a simple manual on how to approach the subject.

Visual acuity is only one part of vision and is only tested by a simple eye check. But functional vision is an individual visual activity, so it must be evaluated with regard to intelligence, education, motivation, patience and experience. Therefore, an intelligent adult with a visual acuity of 0.01 would be more

socially active than a retarded child with an acuity of 0.2.

Ophthalmologist should decide the actual visual activity of the patient while checking the visual acuity and deciding the visual aid for the low vision patient. They should also take into account the daily circumstances of the patients' environment.

The increasing number of aged people

The percentage of aged people has been increasing rapidly since the end of 1970 due to the decreasing birth rate and advances in medicine. According to the Japanese Institute of Population, before 1990, the percentage of people over 65 years of age could be counted in single figures. However after 1990, this reached double digits and is predicted to top 23% in 2020.

According to the statistics of the United Nations Department of Population, the time required for France's 65 years old and over to reach 14% of the total population will be 130 years. This compares to 70 years in the United States, and only 25 years in Japan. This means Japan must act quickly to ensure that problems associated with the aged are tackled properly.

Low vision care for aged

From the view point of ophthalmology, visual acuity is only one part of vision. Good vision is an important factor in maintaining the quality of life, especially for aged people. Even though activities are limited for aged people, they can enjoy a wide rage of information through books, TV and newspapers if they have adequate vision.

Aged people often associate bad vision with their age and hence deny themselves proper medical treatment and/or visual aids. It is therefore important to educate the aged that good vision leads to a better quality of life, and consequently, they should utilize all effective means to provide better vision.

Visiting care of training for walking

The number of aged people is increasing, so it is difficult for them to get access to TDL in rehabilitation facilities. Due to this, the AAVH began visiting care of training for walking in 1986.

year	82	83	84	85	86	87	88	89	90	91	92
in patient	8	15	15	18	14	15	13	14	12	12	13
out patient	0	3	0	5	2	6	9	2	8	2	3
visiting	0	0	0	0	4	6	4	10	8	6	13
total	8	18	15	23	20	26	26	26	28	20	29

The above table shows the figures for the patient visits for the years 1982 to 1992. Among patients, diabetic retinopathy accounted for one quarter of the causal diseases, as did retinitis pigmentosa.

(1) Method for visiting care

The patient, or patient's family, first asks for visiting care for walking training from the AAVH. The medical social worker and walking instructor meet him, and make a plan of the training in detail. The patient then visits an ophthalmologist, an otologist and a physician. The doctors will foward recommendations for the training, and finally, the instructor writes a report of training to the doctor who made the first diagnosis of low vision.

The training time is usually two hours a day, once a week. The walking training period is indefinite, and continues until the patient is ready to receive TDL training. After the walking training, the instructor will further communicate with the patient by either phone or visits.

(2) Contents of training

The main aim of the walking training is showing the patients the walking routes around their house. Furthermore, they will be shown how to continue their study of braille or word processing, keeping their hobbies of knitting, cooking, etc., and obtaining government welfare.

It is also important to teach their families how to support them and how to understand them. Sometimes the instructors have had to spend time listening to the patient's problems.

Conclusion

There are still some limitations in promoting the works of AAVH. Closer contacts between the community, hospitals and doctors are needed. The individual needs of the acquired visually handicapped should be more widely supported and all should join together in the same aim of providing them a better quality of life.

ASSESSING THE AFFECT OF TASK AND ENVIRONMENTAL VARIABLES ON VISUAL PERFORMANCE

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Low vision rehabilitation seeks to limit the disability caused by the visual impairment by enabling people to use their available vision most effectively. Visual function, as defined by performance, is effected by visual pathology. Yet, the affect is not always consistent across individuals, nor across time within the individual.

Corn (1983) proposed a model which recognizes a number of interdependent variables affecting function. This model identifies three domains under the headings of (a) visual abilities, (b) environmental cues, and (c) stored and available individuality. These domains are interactive and are made up of variables which are also interdependent. As a result, a change in any variable within any of these domains may affect function.

The majority of interventions designed for use with low vision individuals manipulate the variables within the domain Corn labeled 'environmental cues' to increase the visibility of the target, thus increasing performance. These variables are manipulated either on the task or in the environment surrounding the task (LaGrow, 1982).

Task Variables

The task variables are those that can be measured directly on the task to be discriminated. Task variables include: (a) light, (b) size, (c) color, (d) contrast, and (e) complexity. Each of these variables effect the visibility of the task itself and as a result have a predictable effect on performance.

Light, for example, is related to performance in a curvilinear manner. As a result, performance will increase as light increases from a low

level. However, performance will eventually stabilize and fall off as light continues to increase. The point at which this phenomenon occurs varies from individual to individual (LaGrow, 1986).

Size effects performance in the same fashion. The object may initially be too small to see. However, through magnification or other means we may increase it to optimal levels. If the object becomes too large, however, performance will again fall off. As a result, we typically seek to provide the least amount of magnification necessary to achieve specified levels of performance.

Color provides a number of cues and at times makes objects easier to see. Color may also relate to performance in a curvilinear manner, since color is related to both contrast and complexity. Contrast and performance are directly related, while complexity and performance are inversely related. Black on white provides for maximum contrast (Barraga & Morris, 1980), so any other color combinations would be less than optimal. However, the addition of a single color may substantially decrease complexity for certain tasks. For example, adding a single color (i.e., highlighting black ink on white paper in yellow) may substantially increase performance for localization by decreasing complexity even though contrast has also been effectively decreased.

The variables discussed thus far specify the visibility of the task itself. However, visual tasks are not performed in isolation. Therefore, we must also consider the environment in which the task is to be performed.

Environmental Variables

Environmental variables interact with task variables to determine the actual visibility of a given task. Manipulation of task variables to achieve optimal visibility in one environment will not carry over into other environments. As a result, one goal in low vision training is to teach the individual to control visibility through the manipulation of both task and environmental variables. Environmental variables include: (a) illumination, (b) distance, (c) position in visual field, (d) environmental complexity, (e) demand and (f) time.

Light is a task variable and refers to the actual amount of light on the task, while illumination or luminance is an environmental variable and refers to the amount and kind of light reaching the eye. Illumination may be affected by the source and/or type of light available, the position of the light in the field of view, the direction the light is being projected, reflectance of the surfaces surrounding the task and the relationship between task and ambient lighting. To obtain optimal performance (a) task lighting should be greater but not more than three times as great as the immediate ambient conditions, (b) the additional light source should be close to the task and between the viewer and the task so that light is not blocked from reaching any part of the task to be discriminated, (c) the light should be shaded and positioned so that no light is projected directly back at the viewer, and (d) the quantity of light should be adjusted in relation to both the conditions and demands of the task and the visual abilities of the person performing the task (LaGrow, 1982).

The distance at which a task must be performed will also have an effect on the visibility of the task. Distance and light are inversely related, as are distance and apparent size (LaGrow, 1982). As distance from the task increases both apparent size and the amount of light reaching the eye decreases. Viewing distance may also effect complexity as well.

Position of the target in the visual field may also effect visibility, especially if the task to be viewed is in line with field deficits. The task may be moved or the viewers position may need to be altered.

Environmental complexity and demand of the task are interrelated variables, both of which are inversely related to performance. Complexity primarily refers to the visual clutter and distractors immediately surrounding the task as well as all other sources of distraction present. Demands for performance refer to the extent of the details to be discriminated, the distinctive features for discrimination, the time available to perform the task, and the criterion for successful completion.

Tasks may be simplified by attending to the environment and eliminating unnecessary sources of distraction. Demand of a task is more

conceptual. Often the task must be analyzed to determine what is actually required of the individual.

- Promoting Optimal Visibility

The visibility of a task may be enhanced by manipulating one or several of the variables effecting it. The task and environmental variables are all interdependent. As a result, a change in any one will affect the degree to which the others contribute to the overall visibility of the task. Therefore, if one variable is deficient, yet static, it is possible to manipulate one or more of the other variables to compensate. For example, if the details of a task are too small to be discriminated, yet the size of the task cannot be altered, then light, contrast and/or complexity may be manipulated to compensate for the variable of size, or the distance to the task may be reduced. However, changes in one variable may produce negative effects in others. For example, a reduction in distance may result in an apparent increase in size, yet at the same time result in too much light reaching the eye. Therefore, light would have to be reduced as distance is systematically decreased.

We are able to determine the effect the manipulation of these variables have on visibility by observing the individual perform the task. Performance is directly related to visibility, easily observed and reliably measured (LaGrow, 1986).

Single-case research designs appear to be ideal for this purpose. Single-case designs provide us with adequately controlled conditions to determine the effect the manipulation of various task and environmental variables have on an individual's performance.

Reversal Design

The simplest of these designs, the reversal (A-B-A-B), can be used to determine the effectiveness of a given intervention where learning is not the primary factor effecting response on the dependent variable (LaGrow & Murray, 1992). In this case, the dependent measure is observed under

two contrasting sets of conditions called phases. The first is the baseline phase (A). During baseline, the subject's performance is measured in the absence of the intervention (i.e., the independent variable is off or not present). Baseline provides the standard with which to measure the effect or change produced by the introduction of the independent variable. The independent variable is introduced in the intervention phase (B). The dependent variable is measured in exactly the same way during this phase. The presence of the independent variable should be the only thing that is different between the two phases (Barlow & Hersen, 1984).

The phases are alternated (i.e., A-B-A-B). In this way, there are a number of opportunities to observe if the presence of the independent variable is indeed controlling the level of response on the dependent variable. Actually, the more demonstrations of affect (i.e., A-B-A-B-A-B), the more confident we are that the independent variable truly controls the response on the dependent variable.

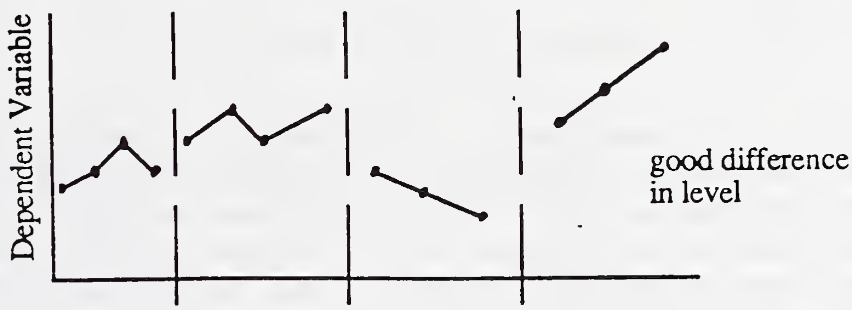
No statistics are needed to determine if this control is established. Rather, the raw data is plotted on a graph for the practitioner to determine if it looks like control has been adequately demonstrated. The use of raw data has the advantage that it makes sense; there is no need to wonder how great of an effect a significant effect is.

Data points can represent a single trial or the average score taken over a number of trials. The decision to go with single data points or averages is up to the practitioner and is based upon the circumstances surrounding the assessment.

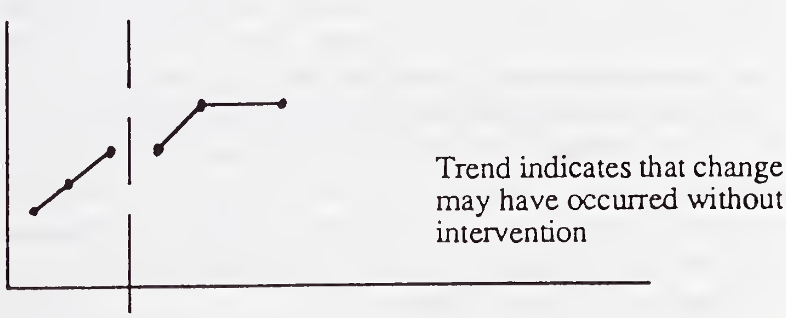
Any single data point can be spurious. Therefore, A minimum of three data points are collected and displayed to establish the trend of the data in the phase. We would hope to have the dependent variable be fairly steady across sessions in each phase. However, if the trend is erratic or moving in the therapeutic direction (i.e., predicted by the hypothesis) then the phase must be extended until stability is reached or at least until a counter-therapeutic trend (i.e., last two data points moving in opposite predicted direction) is established (LaGrow & Prochnow-LaGrow, 1983).

The Practitioner may judge the demonstration of control of the independent variable over the dependent variable by observing (a) level, (b) trend, and (c) overlap. Level refers to the level of the data on the vertical axis.

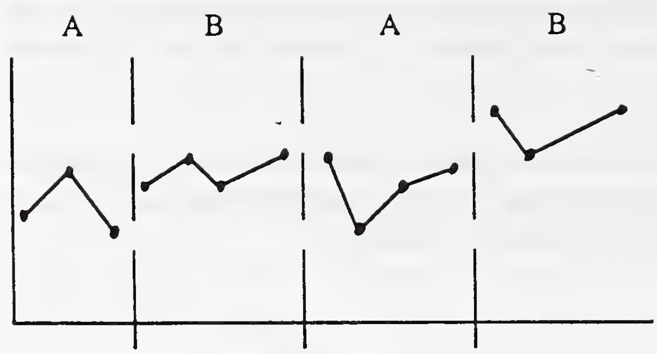
Level. The level should be noticeably different between phases and consistently different across phases. The greater the difference in level, the more dramatic the demonstration of control.



Trend. The trend or slope within phases and across phases should be relatively steady. If the data is moving towards the next phase, we may assume the data would have been obtained without changing phases. If the data is too unstable, we may question whether control was ever obtained.



Overlap. The data between phases should not overlap level. If overlap occurs, it should only occur between the first sessions of phases. If it occurs between later sessions, we must question the control obtained.



Far too much overlap between phases

The utility of the reversal design may be illustrated by investigating the effect of binocularity on localization rate with three visually impaired persons (Kjeldstad & LaGrow, 1986). In this case, all three subjects regularly used monocular distance aids for localization tasks, yet all had similar visual acuities in both eyes with no central scotomas present and were therefore thought to be capable of profiting from a binocular aid. Thus a reversal design was used to determine if a binocular aid of the same power as the monocular aid normally used resulted in quicker localization rates. As can be seen in Figure Four, the binocular did result in marked decreases in localization rates for subjects one and three and a less impressive decrease for subject two, or we could say there was a marked change in level for two of the subjects (s1 & s3), and less so for the third (s2). There was little change in trend for subjects one and two, but an obvious change for subject three. Finally, there was only minimal overlap observed across the phases for the three subjects, most of which was observed across the first two phases with subject three. We could conclude that the use of a binocular aid did result in demonstrable difference for subjects one and three and less so for subject two. When asked however, only subject one thought the difference was great enough to change from the monocular to the binocular for every day use (Kjeldstad & LaGrow, 1986).

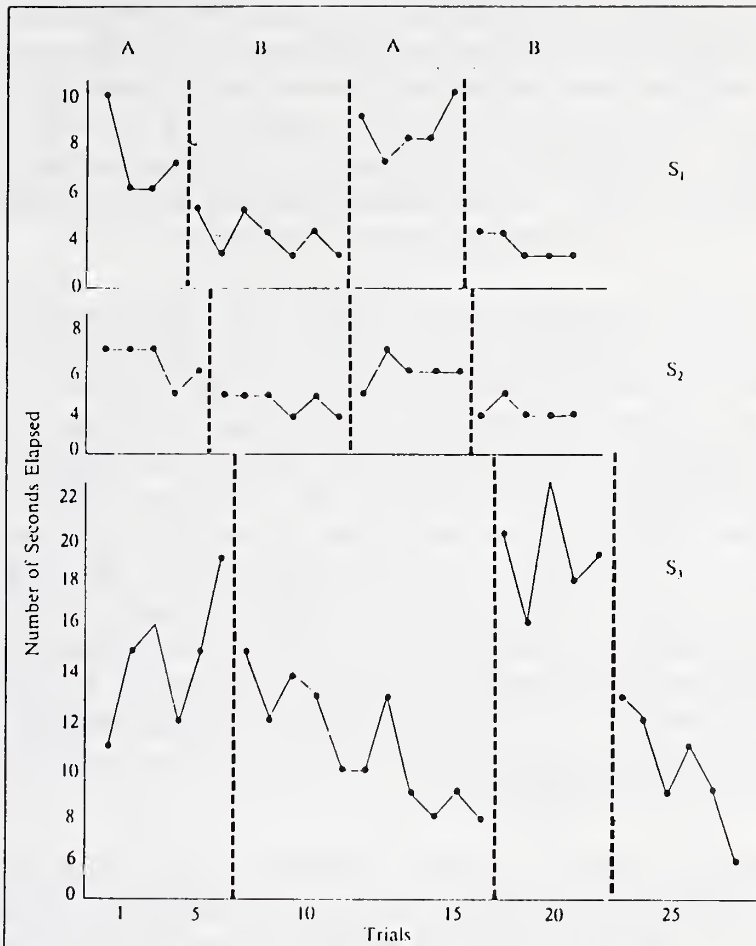


Figure 4. The Relative Effect of Binocular Versus Monocular Telescopic Aids on Number of Seconds Elapsed to Localize and Name Visual Targets Across Three Visually Impaired Subjects

Alternating Treatment Design

The reversal design may be modified slightly to allow the practitioner to objectively determine the amount, level or degree of the independent variable to be used as the intervention of choice. For example, the

practitioner may wish to control the amount of light on the task, believing that this control will result in increased performance. We know that light and performance are related in a curvilinear manner. As a result, the practitioner cannot simply add as much light as possible to the task, since too much light could result in a deterioration of performance. Therefore, it is important to first determine how much light should be added. The alternating treatment design provides the means to do this in a controlled, experimental fashion.

In this case, the practitioner would follow the original baseline (A) phase, with a comparison (B) phase where more than one level (e.g. lamp with 40 watt bulb, 60 watt bulb, and 100 watt bulb) of the independent variable is introduced. In this phase, a minimum of three sessions of at least two and no more than four levels or degrees of the independent variable are introduced. The effect each level of the independent variable has on the dependent variable is measured and recorded. The comparison phase is followed by the first (B') intervention phase. This phase is carried out using the level of intervention selected as most appropriate in the comparison phase. The intervention phase is followed by a return to baseline and a subsequent return to intervention. The alternating treatment design looks like this: A-B-B'-A-B', where A is the baseline phase, B is the comparison phase, and B' is the intervention phase.

This design was used to determine the power (6X, 8X or 10X) of monocular aid which resulted in the quickest response when reading house numbers, street signs and bus signs by a single, myopic individual (LaGrow, Prochnow-LaGrow, Prisk, Murray, Decker & Brady, 1991). As can be seen in Figure Five, the 6X aid proved the best in all three tasks.

There was a marked and immediate change between baseline and all three levels of intervention, some change in trend and no overlap. Two of the levels of intervention (6X & 8X) were clearly better than the third (10X). The 6X was selected as the aid of choice because of the general rule that we always select the least amount of magnification needed to achieve a specified level of performance. Objectively, either aid could have been prescribed to carry out these particular tasks.

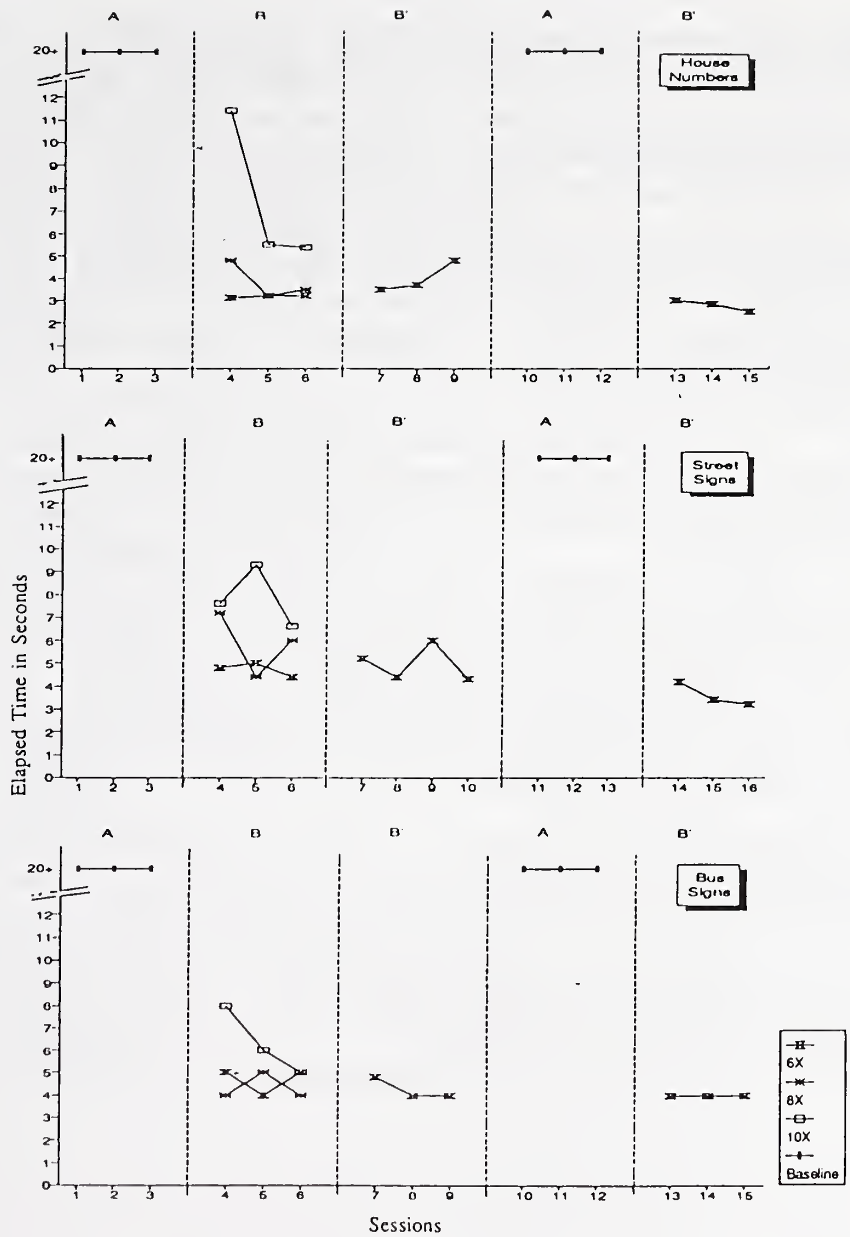


Figure 5. The effects of various powers of magnification on time to correct responding when viewing house numbers, street signs and overhead signs in a bus depot.

Conclusion

The variables Corn (1983) classified as environmental cues may be conceptualized as either environmental or task variables. These variables may be manipulated to positively affect performance and when done so are thought of as either optical or nonoptical low vision aids. The effect of these aids may be assessed using either reversal or alternating treatment designs. These designs are simple to use, need no statistical inference to understand yet provide adequate controls to allow the practitioner to determine if a given intervention is indeed effective, and/or identify the level of intervention which is most effective for a given task.

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FUNCTIONAL MOBILITY TRAINING OF MULTIPLE DISABLED BLIND CHILDREN AND ADULTS

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Multiple disabled blind persons, who constitute a significant part of the blind population, have traditionally received less mobility training than well-functioning blind persons. This low priority of multiple disabled persons, has both historical and theoretical roots. Historically, adventitious blind adults, mainly war veterans, were the first to be given systematic mobility training. Thus, methods and techniques were designed with the rehabilitation of well-functioning blind adults in mind. Theoretically it has been assumed that multiple disabled persons, and also young children, lack learning potential for orientation and independent travel. It has, for example, been hypothesized that prerequisites for efficient mobility training include basic motor skills, haptic/tactual exploration skills, ability to localize sounds, and ability to match and recognize objects. For multiple disabled blind persons who lack such skills and abilities, preparatory teaching is often given priority, and training of self-sufficiency in travel is postponed.

For many multiple disabled blind children and adults, passivity and dependence on others, is a severe life problem concatenated with their physical handicaps. Lack of functional mobility skills, adds to such a pattern of passivity and dependency. It is of major significance for the welfare of the group, to show that they can obtain self-sufficiency in travel through mobility training. In the present report, the effectiveness of mobility route training among multiple disabled and well-functioning blind children and adults, is described and discussed.

Method.

Systematic mobility route training was given in the home environment. A training method manual and data recording forms, was especially designed for the project. The local teachers of the participants were supervised by the Tambartun Mobility Group.

Fourteen visually impaired children and adults, assigned to two functional groups, participated in the study. **Group I,** the multiple disabled group, included eight persons. Six of them had a language problem. Two of them used no words or signs, two used only a few words or signs, and two had a relatively large vocabulary, but no, or only a few, phrase-like sentences. Of these six language-impaired participants, three were diagnosed as mentally retarded, two had motor problems, and one was a deafblind, socially deprived woman. The last two participants in Group I spoke well, but were diagnosed as mentally retarded and autistic, respectively. **Group II** included six visually impaired children or adults, who all had normal language skills.

For each of the pupils, the kind of help given to them by the teachers, was recorded for each of the stages in the route; i.e. the distances from the starting point to the first landmark, between the successive landmarks in the route, and from the last landmark to the goal. Ten operationally defined levels of help, coded 19-10, were arranged in a rank order from full guiding (level 19), partial guiding with tactual contact at the leading point (level 18), partial guiding with some tactual contact (level 17), partial guiding with shadowing (level 16), visual/auditive help (level 15), auditive help (level 14), visual help (level 13), verbal help (level 12), verbal instruction (level 11), to self-sufficiency (level 10) - navigates independently through the route). For any change in the help level, cumulated number of training sessions, trials, in the route, was recorded. For various numbers of trials, mean level of help was computed for each participant. Mean level of help is operationally defined as the sum of the help levels across stages in the routes, divided on the number of routes.

Results.

Each of the eight multiple disabled pupils showed progress during the project period, but the degree and rate of learning varied highly. Five

of the pupils developed 'self-sufficiency' (level 10) in at least one route; the number of trials varying from 11 to 52.

After achieving 'self-sufficiency', one of the above pupils suffered a set-back. His increased need of help, was caused by snow fall and ice on the roads, which changed environmental cues and made it more difficult to navigate through the route. He subsequently ended up, after more than 200 trials, at only a slightly lower help level than he showed at the start of the training period.

Two of the three remaining pupils in group I had less than 50 trials, and performed at a mean help level of 14 ('auditive help'), when the project ended. They were able to travel through several stages only with 'verbal instruction', while they needed partial guiding (levels 18-17) in other parts of the route. One of these pupils had a set-back after about 17 trials, when training in a new route started. An analysis of the recordings, suggests that the teachers were overly encouraged by the progress in the first route, and that lack of help made the pupil anxious. The third pupil had 78 trials at the end of the project period. He showed little progress during the first 55 trials, and his mean help level fell to 12-13 ('verbal help' - 'auditive cues') towards the end of the project period. All these three pupils continued to progress after the end of the project period.

With regard to initial help level, two of the eight pupils in group I needed 'full guiding' (level 19) through the whole route on the first trials. Two others needed full or partial guiding (levels 19-17) at several stages in the routes. Two pupils were given only 'verbal instruction' (level 11) through most of the routes, while they at other stages needed 'visual' or 'auditive cues' (level 13). The last two pupils showed 'self-sufficiency' at several stages in the route, and needed only 'verbal instructions' (level 11) at most of the other stages.

Three of the six pupils in group II needed only 'verbal instruction' when the training started, and achieved 'self-sufficiency' in less than five trials. The three other pupils needed visual, auditive or verbal help at the start of the training period. One of these pupils achieved 'self-sufficiency' after 41 trials. The other two still needed 'verbal

instruction' at the end of the project period; after about 45 trials. These last two pupils were the youngest of the participants. One of them was five, and the other eight years of age, when the project started.

The difference between the two groups, is shown both with regard to initial level of help and learning progression. The group difference in initial help level, is statistically significant (Mann-Whitney U, two-tailed; $p<.01$). There were, however, large individual differences within both groups, and the groups overlapped with regard to initial help level and number of trials before independent travel was achieved. The overlap between the groups and the within-group differences, show that initial help level and learning progression can not be attributed to differences in language skills or mental ability alone.

Discussion.

The findings emphasize the importance of offering mobility training to all visually impaired persons; additional handicaps notwithstanding. It was demonstrated that multiple disabled blind persons can be taught independent travel by means of mobility route training. It seems possible to teach **all** visually disabled children and adults independence in travel; as long as they are not hindered by debilitating motor handicaps, progressive loss of functions, or other medical conditions.

Some multiple disabled persons may, however, need a long training period before achieving independent travel, and setbacks should be expected during the training period. The most severely disabled, will presumably always be in need of a companion in their daily travels.

The fact that even multiple disabled blind persons were able to achieve independent travel by mobility route training, have important pedagogical and theoretical implications. It shows that preparatory training is not required even for the most disabled of the blind population. The theoretical bias against teaching mobility to multiple disabled persons who do not master certain skills and concepts, seems to be unfounded. Preparatory training may restrict multiple disabled persons from learning self-sufficiency, prolong their dependency on others, and impose upon them an unnecessary degree of passivity.

HEARING LOSS AND ITS IMPACT ON MOBILITY TRAINING

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There is a high prevalence of hearing loss amongst people with severe vision loss (functionally defined as occurring when people's vision, corrected by their prescription spectacles, is not adequate for their vocational, recreational or social needs).

Kirchner and Peterson (1980) indicated that 39% of severe vision loss people have a significant hearing difficulty. This percentage increases to 69% when the severe vision loss population greater than 65 years of age is considered. This high prevalence of dual sensory loss is consistent with the clinical experience of the Association for the Blind's Low Vision Clinic where 73% of clients are aged 65 years or older.

The impact that hearing loss has on communication function is immediately apparent. However, this paper will focus on the impact that hearing loss has on aspects of orientation and mobility.

Hearing is commonly used for localization of sound sources. In addition to this directional information, hearing can also be used to approximate the distance to a source.

It has an obvious role in identifying a range of environmental sounds e.g. general traffic flow, traffic signals, the presence of shops, schools and other landmarks. Access to these sounds adds to the overall knowledge of, and familiarity with the environment.

Additionally, hearing is used to receive auditory feedback about self-generated sounds e.g. the sound generated by a cane will vary with the surfaces on which it is used.

The importance of audition for confident mobility is underlined by the need to identify and locate danger e.g. trucks, barking dogs, car horns, reversing signals and other alarms.

Many vision-impaired travellers use specific auditory-based techniques including:
- Sound shadowing (noting intensity and frequency differences when a large object lies between a sound source and the individual)
- Sound signatures of different materials and environments e.g. the reverberation characteristics of a stairwell compared to a small room fitted with soft furnishings.
- Orientation within a room - where the windows and doorways are, and importantly where a particular speaker is located.
- Specially designed sonic mobility devices.

How then does the high prevalence of hearing loss amongst people with severe vision loss affect orientation and mobility training?

1. Asymmetry between the ears can cause errors in localization ability.
2. The person's residual hearing (when aided) must be sufficient to perceive and identify sounds.
3. When hearing aids are provided, not only is maximizing communication ability to be considered but also their effect on mobility must be addressed. Other issues including having binaurally balanced fittings, the use of open moulds (to allow "natural sound transmission") and the increased use of programmable hearing aids (whose amplification characteristics can be varied by the user for the particular task at hand). Meeting the individual's identified needs when fitting hearing devices must be the objective. The development of specific expertise in specialist hearing clinics is a priority.
4. Another aspect of hearing loss and O&M training relates to the ability of the instructor to converse with the vision impaired person - especially when in noisy environments (traffic, shopping centres etc.) Simulation exercises conducted at AFTB as part of education programs have highlighted that when hearing impairment exists with vision loss, the stress, anxiety and

concentration required to confidently hear what a sighted guide is saying is considerable. Certainly the pleasure involved in casual conversation is very limited while travelling under these simulated conditions. Just understanding the important instructions is fatiguing. Thus, the instructor must always be aware that both auditory information and access to non-verbal communication (speech-reading and gestures) may be reduced. Therefore ongoing monitoring of the person's understanding is necessary. The establishment and maintenance of confidence in mobility has to remain a key objective. Issues relating to stress management within O&M programs is the subject of a research project conducted by Diana Seybold, (a paper on which will be presented during this conference).

The issue of hearing impairment in younger people is also of great importance. Although most vision-impaired people experience hearing loss due to ageing, i.e. Presbycousis, conditions such as Rubella and Ushers are well known to have associated hearing loss. In addition, all children (including those with vision impairment) are subject to fluctuating conductive hearing loss. The presence of such a loss has obvious communication and educational implications. Also, it may well interfere with the child's O&M skills development. Thus, there is a clear need for ongoing monitoring of the hearing status of vision-impaired children.

What strategies should be applied for vision impaired people with hearing loss?

Firstly, accurate individual assessment and ongoing review of people's hearing status is essential. Then, the fitting and training with the most appropriate hearing aids and supplementary devices is necessary. Devices such as directional hand-held microphones and FM wireless transmission systems substantially improve communication in noisy environments. The former device can also be used for orientation purposes.

Secondly, professionals, carers and family need to adopt strategies to improve conversational fluency. Strategies that can be used include:

(a) Gaining the person's attention before speaking.

(b) Speaking clearly, concisely and not too rapidly or resorting to shouting.

(c) Rephrasing or selecting different wording following communication breakdowns.

(d) Facing the listener and maintaining a close proximity (approximately one metre) to maximize audition and access to any available visual cues.

Recent studies have demonstrated that while vision loss does reduce people's ability to perceive facial movements (e.g. lip shapes, eye contact) it is not possible to predict the degree of impaired communication function from measures of visual acuity. (Erber and Osborn, 1993) Further studies are being undertaken to determine the influence of other factors such as contrast, sensitivity, field of vision and perception of movements on visual communication function.

In conclusion, then, hearing loss has a considerable impact on the many vision-impaired people who experience it. It affects both communication and general mobility functioning. Fortunately, there exists a range of technical, educational and practical everyday strategies to alleviate the difficulties which hearing loss causes in this population.

It is important to include individual assessment and evaluation of needs, coupled with a flexibility in approach, to provide the best service for people with vision and hearing impairment.

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DEAF AND BLIND: DOES SHE NEED TO KNOW?

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Who should be responsible for telling a child they are deaf and vision impaired? Is it important for a child to know that they are not the same as their peers? Is it an issue that O & M Instructors should be concerned with, or should they simply "get on with" the job of teaching orientation and mobility if this is what the parents wish them to do? Is the child better off not knowing they are "different", and should this knowledge be kept from them in order to "protect" them until they are old enough to cope with it?

These are some of the issues that I have come across whilst working with a young deaf-blind girl. The purpose of this paper is to look at some of the current thoughts on these issues, in relation to this particular case, a ten year old congenitally deaf-blind girl.

"Emma" was born with no vision in one eye, and a small amount of useful vision in the other. She has been profoundly deaf since birth. She has received orientation and mobility training over the past 5 years, which has included basic independence skills, long cane training and concept development. She communicates through tactile signing and braille. She has never had her disabilities explained to her to any extent, including never being told why she wears hearing aids and uses a long cane. This had led to a conflict between her parents, who do not want her told about her disabilities until she is older, and the professionals involved, who believe she needs to learn about this aspect of herself.

In terms of her mobility, Emma has good orientation skills around both her home and her school, and can move independently and safely around these areas. Once she has been taught a

new route, she is able to travel it using a combination of residual vision and long cane skills. Intellectually, she is high functioning, and will respond to complex instructions given in either braille or sign. However, problems arise in her communication - she gives very restricted answers, usually only one or two words, and she will not initiate conversation unless prompted. This has raised some problems in terms of teaching her about her disability.

Most of the information relating to telling children they have a hearing and vision impairment is linked to the condition of Usher Syndrome. This is a situation where a child may have a vision impairment for many years before they are aware of it. Often, parents have withheld this information from their child, as they feel it is protecting them from having to cope with the information. Most of the literature, however, recommends telling children as young as possible, as it is not until they are aware of the problem that they are able to find ways of coping with and accepting it. (Duncan, Prickett, Finkelstein, McKay & Hollingsworth, 1988; Hyvarinen, Gimble & Sorri, 1990)

A recent study done in Victoria, Australia, entitled "The Report of the Usher Syndrome Project" (1992) touched on this issue. They found that parents "did not give the diagnostic information to their children for a number of reasons. . .(including). . .the communication barrier, their own lack of confidence in their understanding of Usher Syndrome, and the paucity of guidance to assist them in choosing the appropriate time and manner of disclosing the diagnosis. Consequently, their children, as adults, feel angry and suspicious towards their parents for withholding information from them." (p 65)

The situation for a congenitally deaf-blind child is somewhat different to that of a child with Usher Syndrome, although I believe the reasons behind telling a child they have a disability do

not vary. The majority of Usher Syndrome children are aware of their deafness, and because their vision loss is degenerative, they often become aware that something is wrong before they are "officially" told. For a congenitally deaf-blind child, their condition is all they have known. They have no way of judging how other people see or hear, because to them, the way they function is normal. If a child is profoundly deaf and totally blind, or has very low vision, how are they to know that this is not the way most people are unless someone tells them.

Because Emma does not ask questions regarding herself, and has very little communication with the other children at the school she attends (where she is the only deaf-blind child), she has not learnt about her disabilities from her peers, as many children do. She is restricted to what adults who are able to communicate with her, tell her. Because of her lack of communication, her parents feel she is not ready to be taught about her disabilities, and that she will have psychological problems in dealing with them. However, we must remember that she is not adjusting to a change in how she functions, but will rather be learning why she does things in certain ways. A recent paper by Sister Bernadette Wynne, from the Helen Keller National Centre for Deaf-Blind Youths and Adults, stated "The persons in this group (ie congenitally deaf-blind) who are deaf-blind do not know they are deaf-blind. Unless there is progressive or sudden loss of vision and/or hearing, the psychological adjustment is minimal compared to the previous groups." (Adventitiously deaf-blind) (p 9)

Emma is already showing some signs of being aware of her differences. She has enough residual vision to be able to see that others around her move around and communicate in different ways to herself. Her behaviour has changed quite markedly in the last 12 months. When she was younger, she was very curious about, and motivated to learn about everything she could.

Now, she will not move independently unless physically prompted, including resisting going to the toilet until the last possible minute. She frequently becomes frustrated and angry in all lessons, including mobility. At other times, she is lethargic and extremely passive.

I feel that this dramatic change in her behaviour is related to the fact that she has realized she is different from others, but does not understand how or why. This is the only way she knows how to express the complex emotions she must be feeling at this time. She is also at the age where her self concept is being consolidated. It has been found that the majority of disabled children (with the exception of those "who hardly register their symptoms and communicate with their surroundings" (Lagerheim, p 77)), "show symptoms of a depressive crisis during the age period 8 to 11 years." (p 77) A Swedish study which was undertaken in 1982, and discussed by Berit Lagerheim, looked at this incidence of depression. They found that a high percentage of disabled children of the ages 8 to 11 showed behaviours such as aggressive behaviour at school and at home, passivity, unhappiness and worsened school performance. The findings were summarised as follows: "From the point of view of developmental psychology we interpret the results to show that the increasing realism of children during latency enables them to understand their situation and to compare it with the one of others. They can now feel that they are different, and unfairly affected." (p 77) They also found that "these (symptoms) disappear when children and parents have learned to accept the situation." (p 69)

Emma's behaviour ties in with these findings, and it is highly likely that she is experiencing similar feelings. However, she has the added problem of not knowing even how she is different to others of her age. A program has been worked out for teaching Emma about her disabilities, emphasising the positive aspects about herself, such as the fact that she has some useful vision

she can use. This has been discussed with her parents, but they still feel, and perhaps rightly so, that they should be the ones who make the decision about when to tell her, and should bear the consequences of that decision. At this point in time, they have not yet decided to tell her.

There are many other aspects of this issue that can be raised, however due to time limitations in this paper, I obviously cannot discuss them all. I see my role as Emma's O & M Instructor as being one where I must educate her family as much as possible on these issues, but I certainly feel I also have to respect her parents decision. As more and more information is being published on deaf-blindness as a separate and unique disability, we are better able to educate the public and families as to the best teaching and intervention strategies for these children. I have not heard of a similar case to Emma, and hopefully it is an unusual one. In any case, I hope I have raised a few issues that you may not have considered before, and I would be glad to hear of any similar experiences that people may have had.

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TEACHING O&M TO MULTIHANDICAPPED STUDENTS IN THE GREATER LOS ANGELES AREA

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To start my presentation I would like to mention the historical fact that public education in the United States was implemented until the l900's. Before that time only the rich were able to get education . Statistics show that in 1876 only 5% of the children between the ages of 5 and l7 were in school, and it was common for children to attend classes for only a few years, and for just a few months of the year. Until l918 , when educational reformers and organized labor joined to win the first child labor law and to advance the cause of public education in the nation, compulsory education was established in the country. The social attitudes during the early decades shifted radically for the well being of the children,and they started to be treated as individuals with their own special needs and desires. During this period the development of psychology, educational theory and practice, government policy, medicine and technology, formed the background for the implementation of special education in the United States. Wars and the need to rehabilitate injured veterans, the creation of advocacy groups, parents organizations, and the cooperation of the

government created the groundwork for the great progress in educating the young people, and a better understanding about the complex needs for this special population.

Beginning with the first Conference on Children and Youth in 1909, and the founding of the Children's Bureau in 1912, the United States through legislation, funding, research and development , plus the creation of training programs at the universities, and the resurgence of the Civil Rights movement with its effort to integrate racial minorities took an active role procuring the services for the handicapped.. Traditionally the school system operated on the concept that its primary role was to provide education for the majority which meant the normal students, but the alliance of parents of handicapped children and minority groups pushed strongly for changes in the system, to get an equal non- discriminatory education for all the children, regardless of their handicapping condition.

Through federal legislation several rules were implemented to mainstream the exceptional student with two basic purposes: to protect the right of handicapped children, and to make life as normal as possible for them.

After many years of litigation, legislation, amendments,and reorganizations, we finally got the Public Law 94-142, which was immediately recognized as a landmark in legislation for education. The Education for All Handicapped Children Act as is was called, provides free public education for handicapped individuals. This law has 5 major components, which are: 1. Right of free appropiate education, 2. Non - discriminatory

evaluation, 3.Procedural Due process ,4.Least Restrictive Environment and 5. Individualized Education Program (IEP).

The IEP refers to a written education plan that must be developed annually for all handicapped children receiving special education services. The IEP is the one safeguard parents have to insure that their child receives instruction designed to meet the child unique's needs.

Prior to placement of a handicapped child, a selected committee composed of a representative of the school system, the child's teacher,or both parents, and other individuals hold an IEP meeting at which they write and sign the IEP.

The way that services for the blind and visually impaired have been provided historically, reflected at first the need to rehabilitate injured veterans, then expansion of the services to the adult population. The visually impaired and blind population was the last one to be considered Now,.research continues on the area of the Multihandicapped blind and visually impaired population. New measurements have been developed, new methods for teaching, new equipment and technology for adaptation of the visually impaired, but we have to recognize that we still have a long way to go . I believe that the Instructor should get a better understanding on developmental and physical deficits, which would allow the teacher to have a grasp of the child's unique condition..

Having a good understanding about a child's degree of retardation, would help the teacher to plan specific programs or

lessons designed to increase the child's skills, academic functioning, and a better emotional balance. The teacher would be able to understand the child's psychological and medical information and might be able to stimulate to increase his/ her learning and to assist student to remain in task.

The teacher must be able to understand the basic principles on which Behavior Modification is founded, and to use the techniques whenever he feels it is convenient for the discipline and motivation of the child. Sign language is another valuable tool for the multi-handicapped child. Teachers are able to facilitate a communication vehicle with an increased number of handicapped children.

For handicapped children to be properly served in society, schools must accept and serve them in an environment that is as normal as possible.

Mainstreaming, or placing of handicapped students in regular educational classrooms with regular students, is also a common practice in the United States. However,each individual student with his/ her individual needs must be considered. Mainstreaming, of course, means more than following the letter of the law. Simply putting handicapped students in the regular classroom will not necessarily fulfill the intent of the law,which is to place handicapped children in the least restrictive educational environment, so they can have lives as normal as possible, in order to establish / or maintain personal behaviors and characteristics which are as culturally normative as possible".

The role of the neuropsychologist in Orientation & Mobility training: a case study

Ian Stuart & Jenny De Bruin*

*Jenny De Bruin is an Orientation and Mobility Instructor for the Royal Guide Dogs Association and Ian Stuart is a Clinical Neuropsychologist who works at the Austin Hospital/Royal Talbot Rehabilitation Centre. Both are from Melbourne.

T.L. is a ten year old boy was referred by the Visiting Teacher Service for Orientation and Mobility Training following complaints that he had become spatially disoriented on a number of occasions. At the same time the school commented that he was suffering from a poor memory with associated learning problems. Medical records showed that he was suffering from optic nerve hypoplasia, myopia and nystagmus, thought to be associated with premature birth. Glasses was worn to correct the myopia. A neuropsychological assessment had been undertaken a year earlier and had identified some problems in sequencing and attention. Visual acuity in the right eye was reported as 3/60 and the left eye was 6/60.

Jenny De Bruin (Orientation and Mobility Instructor) assessed him functionally in the school environment and noted that he:

* moved well in familiar areas
* was easily distracted from the task in hand
* could not retain instructions

At this point Jenny asked me to become involved and we decided to observe his travel in more detail. We selected two travel routes, each of which included uncontrolled road crossings in both residential and semi-business areas. Route 1 was relatively simple involving travel around a local block. Route 2 was more complex, involving a number of blocks with heavy traffic at some intersections.

<u>Observations made:</u>

Route 1

* Crossed diagonally into the middle of an intersection, and appeared unconcerned about his personal safety.

* Did not stop consistently at kerbs, prior to crossing any roads.

* Constantly needed prompting to maintain his attention on the task in hand.

* Was attracted to irrelevant stimuli within his environment.

* Road crossings were unreliable, unsafe and inconsistent.

Route 2

* In addition to remembering the route, T.L. was required to complete a task for his mother at the local shop (three items on a shopping list).

* T.L. was very unclear on the correct sequence of instructions, despite many rehearsals.

* Road crossings were inconsistent and unsafe. He showed no concern for his personal safety when he walked across the road without stopping, looking or listening. This occurred when crossing parallel with a main road.

* Disorientation along part of the route - appeared not to recognise a section of the route that was travelled on in the previous route. (Poor landmarking.

* Distracted by every irrelevant stimuli. ie. he saw a cat across the road and proceeded to chase it down the street.

* Needed continuous prompting to resume the task at hand.

* Could not remember consistently all three times he was to purchase on the list.

* He said he did stop, look and listen when in actual fact he did not.

<u>School situation:</u> We met with his teachers, some of whom were supportive but one described him as a poor student, believing him to be self-centred and manipulative with difficulty in making friends. She believed that T.L.'s mother was being over-protective by accompanying him to school.

Neuropsychological Assessment showed

1. Intelligence in the bright normal range.

2. No evidence of intellectual impairment although his poor vision and difficulty in seeing detail reduced his scores on some tests.

3. Memory for verbal and visuo-spatial material was intact.

4. No evidence of spatial difficulties.

5. Poor impulse control, severe impairment in areas of planning and self-monitoring.

6. Although upset by his school difficulties, T.L. denied any feelings of depression.

Conclusions drawn from observation and assessment:

T.L. shows signs of frontal lobe dysfunction with:

1. Severe distractibility.

   He is constantly distracted by irrelevant stimuli in the environment. All stimuli have equal weight for him and he is unable to filter out and to select the stimuli in relation to his goals. Then amounts to a severe attentional disorder.

2. He shows a severe disorder of impulse control.

   Outdoors he is drawn to visual stimuli and is unable to suppress that impulse in order to go through a safety procedure.

3. T.L. cannot plan his actions in advance, nor can he monitor his performance as he moves about in his travel.

4. This leads to inconsistent, unreliable performance; he may act correctly on 9 out of 10 road crossings, but his behaviour is unpredictable.

5 At this stage the problem would appear to irremediable since any training that is done is still liable to be ignored under stress and may thereby place his life at rish. There may be improvement with age.

Actions taken

1. Jenny and I supported T.L.'s mother, confirming her belief that he is not a safe independent traveller

2. We emphasised to all concerned that no independent road crossings should be undertaken.

3. We met with the school staff and pointed out:

   a That his behaviour is basically caused by organic problems
   b. That he would function best in a quiet environment, free from distractions and competing stimuli.
   c. That some counselling may help in his adjustment.

4. Recommend review at regular intervals.

The Assessment of mobility outcomes for people who experience a homonymous hemianopia with unilateral visual neglect as a result of brain injury.

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People who experience a homonymous hemianopia with unilateral neglect as a result of brain injury have difficulty identifying and responding to stimuli in the visual hemi-field contralateral to the lesion. The presence of these visuo-spatial disorders can disrupt many aspects of daily life, such as self care skills, mobility and reading. Whilst a hemianopia can occur in isolation the concurrence of hemianopia and visual neglect has been shown to have adverse effects on the outcome of treatment in rehabilitation centres.

There are many standardized tests to assess for the presence of unilateral visual neglect. Neuropsychologic tests typically rely on either pen and paper tasks or desk top exercises. Physicians test for neglect at the bedside, relying on variations of confrontational tests used to determine visual fields. Occupational Therapists use a battery of pen and paper tasks to evaluate perceptual dysfunction, adding to this their observation of daily living skills such as dressing, washing, and making a light snack. The effects of perceptual problems on ambulation and orientation are seldom included in structured assessments of neglect, despite these activities forming core criteria for admission to and discharge from rehabilitation.

For those involved in the remediation of visual neglect the information gained from these conventional tests has limited practical applications. There is very little basis to assume that improvement on simple pen and paper tasks is accompanied by improvement on more complex activities. Studies have shown that performance on pen and paper tasks improves in the first few months after the stroke, while the effects of neglect on complex functional tasks appears to persist for much longer.

The involvement of the Royal Guide Dog Association of Australia in neurological vision impairment dates back to the late 1970's. At this time Betty Hill, the Chief Speech Pathologist at the Royal Talbot Rehabilitation Hospital was concerned by the apparent lack of transfer of scanning strategies taught in rehabilitation from desk top exercises to mobility tasks. Betty sought the advice of Don Verlander, then an Orientation and Mobility Instructor at the Royal Guide Dogs Association of Australia, and together they developed a programme which combined static scanning

The programme they developed remains somewhat unique in its attempt to address the effect of visuo-perceptual deficits on mobility, these often being ignored in the quest for physical recovery from neurological impairment.

The training programme currently offered uses a display of lights, similar to that used in the work of Diller and Weinberg. As with their work, the initial aim of scanning exercises is to increase the patients awareness of the field deficit by presenting them with a task that is sufficiently compelling to cause head turn to the neglected side. The establishment of the patient's visual search of the effected field, in a systematic, even-paced manner, often in the presence of conflicting stimuli, forms the basis of static scanning training.

When this is achieved without the need for external prompts, the patient progresses to the mobility exercises. These encourage the incorporation of scanning strategies into their walking pattern. The ultimate objective is to establish scanning as an automatic pattern of behaviour, unrelated to the presence or absence of visual cues.

The degree to which a patient is able to maintain this scanning behaviour when travelling through busy environments is dependent upon the presence of additional physical and cognitive deficits. An inability to learn new strategies, to initiate these motor patterns, or to self- monitor scanning behaviour will adversely influence the outcome of training.

In order to quantify the degree to which functional scanning has been achieved, it is useful to observe the performance of the patient on a structured mobility task. For this purpose we use a therapy area of an Adelaide Rehabilitation Centre where a mobility assessment course has been set up to test obstacle avoidance, identification of targets and a client's ability to remain orientated by following written directions.

The twenty four targets are placed at different heights and against a variety of backgrounds. The targets are not visible until the individual is adjacent to their position, requiring them to scan in a systematic and effective manner in order to identify them.

The placement of targets has been planned so that some are more difficult to identify than others, in an effort to ensure that the assessment is sensitive to changes in scanning performance. An indoor route was chosen so as to be suitable for the majority of clients referred for scanning training, many of whom are seen as inpatients of rehabilitation centres, in the acute stages of recovery, and have limited physical endurance.

To illustrate the application of the training I will briefly describe our intervention with a client who commenced a programme, 27 years after the onset of unilateral visual neglect. It is hoped that this case study will also highlight the advantages of using a structured functional assessment of complex mobility tasks as an adjunct to the conventional tests currently in use.

CASE STUDY

Mrs. L. - D.O.B. 23/12/49
Referred to the Guide Dogs Association of S.A. & N.T. by her Optometrist for a functional mobility assessment after Mrs. L. reported having difficulties moving around busy environments.

MEDICAL HISTORY

1966 - Onset of left homonymous hemianopia.
- Arteriocytoma diagnosed, treated with deep ray therapy.

1979 - Victim of gun shot attack.
- Approached by deranged person entering her work place armed with gun. She challenged his presence as she was unaware of weapon ((L) visual field).

SOCIAL HISTORY

- Married with two teenage children.
- Sole parent after sudden death of husband.
- Worked in Nursing Home until time of attack.
- Now currently works as volunteer for St. Johns Ambulance service, attending community functions to provide first aid.

INITIAL ASSESSMENT

Optometrist Report - Left homonymous non-congruent hemianopia with macular sparing.
Scanning Machine - Mrs. L. Omitted the extreme peripheral lights on left when they were presented at speed.
Mrs. L. was aware of need to turn her head to left, but was inconsistent in the degree to which this was carried out.

RIVERMEAD - Mrs. L. completed all sub-tests accurately apart from the article reading exercise, where she omitted the left column of print.

MOBILITY ASSESSMENT - The client was observed walking in her local shopping centre. In this busy environment Mrs. L. walked quickly with a rigid posture. She showed some evidence of scanning, however, she demonstrated poor identification of visual cues in the environment (asked to look for exit signs) and slow reactions to stimuli of an unpredictable nature.
Her orientation was reasonable, however, Mrs. L. avoided the recent additions to the Mall, as she claimed they were confusing. Mrs. L. reported a high degree of anxiety when confronted with busy, cluttered areas (i.e. inside supermarkets).

Although these difficulties could not be regarded as a safety issue they were viewed as significant by Mrs. L., placing restrictions in her ability to participate in joint activities with her children in similar settings. She was also restricted in her work with St. Johns because of her avoidance of crowded environments.

As with many measures of mobility skills, assessment of Mrs. L's difficulties when moving through busy areas was based on subjective impressions, and her own anecdotal reports. It was possible, however, to clearly demonstrate the presence of a scanning deficit by measuring her performance on the structured mobility walk.

On initial assessment Mrs. L. completed the obstacle avoidance component of the task without difficulty. She did, however, fail to identify 8 of the 12 targets on the left compared to correctly identifying 10 out of 12 on the right.

STATIC TRAINING

A training programme was commenced aimed at improving scanning behaviour. The static phase focussed on supplying proprioceptive feedback for the degree of head turn required to adequately cover the affected field with residual vision.
Over the 3, one hour static training sessions, exercises using the scanning machine were given to prompt an even-paced search of the affected field. The aim of certain exercises was to overcome the perceptual 'pull' towards visual stimuli appearing in the unaffected visual field.

MOBILITY TRAINING

When consistent performance on static exercises was achieved the transfer of scanning strategies to mobility tasks was commenced in familiar home environments.

On a regular walk Mrs. L. was asked to scan to the affected side to locate letter boxes and open windows. Such was her motivation that she combined this task with a regular letter box drop of advertising material.

Scanning strategies for busy, dynamic environments, such as shopping centres, included walking down the left side of passageways, scanning for openings or doorways, and naming objects seen at the rear of the store. This was practiced twice weekly for one month prior to the re-assessment.

Training was considered completed when Mrs. L. was observed to walk with safety in busy areas. Scanning to her left at a rate appropriate for her walking pace and the number of other pedestrians present.

At the completion of training Mrs. L. reported a perception of increased visual fields and improved awareness of her environment. Her pace of walking had slowed, allowing adequate time for her to respond to visual information in her environment. She reported increased confidence and enjoyment of shopping.

Improvement in these subjective reports was supported by a measureable change in scanning behaviour on the mobility walk.
Post training results showed an increase in identification of targets on the left from 4 to 10 of the twelve and with only one missed on the right side.

Whilst it is not possible to generalise the results of individual case studies to our client population as a whole, these changes in scanning patterns serve to highlight the following points.

1. Reports of spontaneous recovery based on improvement on pen and paper tasks may belie the extent of disability that persists on complex tasks.

2. Measurement of functional mobility outcomes following rehabilitation programmes, by an appropriately qualified orientation and mobility instructor, should form part of the general assessment for unilateral visual neglect. This requires a structured approach in order to quantify changes in performance.

BENEFITS OF MOBILITY ASSESSMENTS

An easily repeatable mobility task can provide useful feedback to individuals, increasing insight into potential difficulties. It can assist therapists in making comparisons between patients and monitoring an individuals performance over time.

Performance of scanning behaviour on mobility tasks can guide clinical staff making discharge plans for individuals, highlighting any discrepancy between their physical ability to walk unaided and their ability to effectively view their environment whilst mobile.

Finally, for those of you attending the conference whose professional training does not include specific orientation and mobility skills, I urge you to consider the advantages of including a qualified O & M as part of your rehabilitation team.

They can add a different perspective of mobility, bringing together the physical, perceptual, and cognitive skills required for safe travel beyond the confines of a rehabilitation setting.

For those mobility instructors who have the opportunity to provide programmes to this client group please do not labour under the impression that an individual's mobility is your sole domain. Close co-operation with Occupational Therapists and Physiotherapists is essential to achieving successful outcomes for the client.

EVALUATION OF A TRAINING PROGRAM DESIGNED TO IMPROVE MOBILITY SKILLS FOR PEOPLE WITH HOMONYMOUS HEMIANOPIA.

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Homonymous hemianopia refers to the loss of half of the visual field, resulting when the visual pathway is interrupted posterior to the optic chiasm. This can occur due to cerebrovascular accident, tumours or trauma.

Homonymous hemianopia with lesions completely inside the occipital pole can be demonstrated to functionally recover ie:- although the hemianopia exists, the person rapidly learns to compensate. However, fixed homonymous hemianopias produce a condition in which the person, despite normal vision in one field, is unable to shift their gaze to see whole objects or to scan a whole scene when walking in space. No compensation through eye or head movements is sought, and the person is left with half an image of everything. Functional problems such as reading only half a page of print and bumping into objects on the affected side can result. Awareness of the deficit has been found to be a significant factor for compensation (eg: Lawson, 1962; Gassell and Williams, 1963), as has the presence of neglect.

For those people with homonymous hemianopia and associated neglect, who aren't aware of their deficit and who don't compensate for it, the question of rehabilitation is raised. Despite the fact that many brain-injured patients show a considerable recovery of function, particularly over the first few weeks post incident (Wade, Wood and Langton Hewer, 1984), it has been noted that recovery from visual neglect and homonymous

hemianopia may exert a slowing influence on rehabilitation and therefore intervention aimed at accelerating recovery may be useful (Sunderland, Wade and Langton Hewer, 1987).

Visual scanning exercises have been found to be helpful in improving compensation for visual field defects and that reinforcement and encouragement are very important factors in teaching people to compensate for homonymous hemianopias (eg:- Johnson and Cryan, 1979). However, it has been found clinically that merely telling a person to attend or look to their affected side is ineffective in remediating faulty scanning habits (Gordon, Hibbard, Egelko, Diller, Shaver, Lieberman and Ragnarsson, 1985). Diller and Weinberg (1977) completed one of the first studies which recorded the behavioural techniques in treating people with left homonymous hemianopia and left sided hemi-inattention. The rationale behind their program was to make the subjects aware of their deficits and force them to view the stimuli systematically, and to repeat the exercises frequently so that scanning became automatic. Their study indicated that basic scanning training improved left to right scanning behaviours over a range of situations.

The Royal Guide Dogs Associations of Australia (RGDAA) is a voluntary agency providing mobility based rehabilitation services to blind and vision impaired clients in all states of Australia. Hill (1988) elaborated and trialled the training procedures described by Diller and Weinberg (1977), resulting in the training program currently used by RGDAA. The techniques are

based on two areas:-

1. static scanning training using a machine consisting of two rows of brightly coloured lights set in a matt background, and

2. mobility training where static scanning skills are transferred to a more dynamic environment.

As no empirical research has been conducted into the efficacy of this program and the relative value of the training components, the aims of this study are to examine:-

1. whether scanning machine training or mobility training OR a combination of the two leads to improved mobility skills.

2. whether the training results in a greater improvement than would have occurred by spontaneous recovery, self-taught coping strategies or a combination of the two.

3. whether the improvement in mobility skills (if any) is maintained over time.

4. whether training generalizes to other activities involving scanning.

Subjects were randomly assigned to one of three groups - two experimental groups in which the order of training was different, and one control group which received no training at all. The measures used were a mobility route which included both obstacle avoidance and spotting markings; a line bisection test for visual neglect; and the visual fields as measured on the scanning machine. Each subject was assessed on all measures twice before training to establish a baseline level of functioning; once after each type of training (static scanning and mobility); and at a three month followup.

The results of this study indicate that training has a significant role to play in improving a clients mobility skills within a relatively short period of time; that training within a naturalistic as opposed to clinical environment is a significant factor in improving mobility skills; and that skills learned during training are maintained over a period of time.

Some problems encountered within the context of this study include the actual measures themselves ie:- there are no actual existing measures for mobility in a brain injured client; mobility involves skills more comprehensive than spotting objects and avoiding obstacles; the number of subjects in the study was small due to logistical constraints; spontaneous recovery was difficult to accurately measure; and there was a great variety between the subjects.

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RoboCane®: A SOFTWARE MODEL OF CANE COVERAGE AND RESULTING SAFETY

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Introduction

Empirical research based on clinical observation has raised many questions about cane techniques, for example, having the cane hand centered. While there have been no studies to evaluate the maintenance of the cane techniques as taught, the clinical observation has been that visually impaired travelers do not keep their hand centered as taught. The question then becomes, if the prevailing thought of having the hand centered provides much better protection, wouldn't the visually impaired person be bumping into many more objects? In doing so, the frequent collision would reinforce maintaining the hand centered. The objective analysis of the cane technique using RoboCane® indicates that having the hand centered provides less detection of ground anchored objects (poles, parking meters, benches, etc.) than having the hand to the side with the arc touching directly in front of the right shoulder (ex. holding the cane in the right hand) and then across the body in front of the left shoulder. Until the development of an objective measurement tool to evaluate the cane techniques, the relative safety of various cane techniques have been argued on an emotional rather than an empirical level. Also, the generation of new techniques to meet the needs of the changing population have been done by trial and error at the expense of the visually impaired individual.

It cannot be stated strongly enough that after all the years since the development of the long cane techniques, there have not been any studies that have analyzed the effectiveness of these techniques nor followed up on the retention of the techniques. In the absence of objective information, O&M specialists revert to a traditional approach of mobility training for visually impaired individuals, which may have little relevance to the uniqueness, maintenance of cane techniques, and safety of the individual traveler. The RoboCane® modeling program has provided information and data that challenge the way the long cane has been taught over the past fifty years. The investigators have used this software to study the effects on coverage of centering the cane hand, stride length, constant contact and a high center of the arc. Also, it has provided objective information to identify problems suitable for solutions. In addition, the use of this software modeling program provides a unique opportunity to analyze the techniques that visually impaired individuals may have adapted that may be superior and safer than the traditional techniques currently being taught. The follow up and critical analysis of the cane techniques will be the first time to learn from the consumer about cane techniques, based on objective measurements and information.

Historical Background

To date, there have been only a few limited studies (Uslan and Manning, 1974; Uslan, 1978), seeking to evaluate the coverage (detection of safe path) of "the cane technique" and the resulting level of safety for specific travel hazards, such as open manholes. Unfortunately, these studies were limited by their underlying models and the available computing technology. Based on these limitations, the studies were only able to evaluate classical techniques with only limited variations.

The RoboCane® (Blasch & De l'Aune, 1992) was designed as a basic model of cane coverage for a totally blind individual. This is a software modeling program that simulates the coverage pattern of a long cane when employed by a blind traveler. After requesting information about biomechanical factors such as the subject's stride length, hand position and cane length, the program displays a two-dimensional "top view" of the traveler's foot fall, cane movement pattern, and points where the cane tip touches the ground . Cane coverage is defined, "as the ability of the cane to

detect an obstacle or hazard in the students path" (Blasch, De l'Aune & Blasch, 1993). A measure of percent protection (the coverage required by the traveler minus the coverage provided by the cane) is generated from this output.

The technique of orthographic projection to generate a technique profile, not unlike the work of Uslan (1978), has been implemented in software for a micro-computer. The software based model RoboCane®, described in this paper, plots cane position over time based on (1) the length of the cane, (2) the cane hand position, (3) the vertical distance between the cane hand and the ground during the cane's operation, (4) the width of the cane arc, and (5) the length of the traveler's stride and foot placement. As part of the graphically presented coverage profile, the computer indicates where the cane tip makes and maintains contact with the ground. Foot prints are also illustrated to indicate the coverage and safety provided by the cane tip in relationship to the foot placements.

Using RoboCane®, the O&M specialist places user defined obstacles in random positions in the simulated traveler's path and generates the probability of an unprotected traveler-obstacle collision. This probability in conjunction with the frequency of occurrence of such obstacles in the user's travel environment can be used to generate a safety index for the traveler.

A few examples of various cane techniques will illustrate the value of RoboCane®. The first perimeters are based on my stride length, cane length, etc. The first example is the calculation of the percent of cane coverage from ground anchored objects at least 94 centimeters high. The coverage is just 40%. If the cane length is increased from 124 to 152 centimeters to provide greater preview, the percent coverage is 47% but it is apparent that the tip no longer provides coverage for foot placement. Going back to the original cane length of 124 centimeters, if stride length decreases from 180 to 107 centimeters, the percent coverage increases to 52%. This manipulation is critical for two reasons: first, the coverage increases, and second, the individual is not clearing the area of foot placement. If the person walks "out of step" (the cane touches in front of the forward foot), the cane touches the surface where the foot will step, one stride in advance. If the cane is lengthened to 165 centimeters and the person walks in step, the

coverage is 67%, and the person is touching where the foot is placed, three steps ahead.

A number of other important variables and functions have been incorporated into RoboCane® to make the outputs more closely reflect reality through the underlying model (see figure 1). These additional variables include shoulder width, distance of cane hand from the body, range and symmetry of cane hand movement, arc height and symmetry, foot size, and orientation (such as out-toeing). These measures of variability are then used by the RoboCane® in the analysis. Environmental obstacles can also be incorporated and randomly presented . With these computer manipulations, the complexity of the cane technique becomes striking.

One of most powerful features of the RoboCane® is its ability to take client parameters and random placement of obstacles and run many trials. The large numbers of trials provide an accurate, probabilistic estimate of a safety index for any combination of user, cane, or environmental characteristic. This type of computer simulation is an accepted practice called Monte Carlo Simulation. This technique is a related but much more powerful concept than that proposed by Uslan that considered only a single coverage profile and simple computation of percent coverage of a given cane/technique configuration. Through this process we can answer a question such as, what is the probability of a traveler who is visually impaired with a particular set of characteristics to step into a randomly placed, unprotected manhole? It takes 1,065 trials to generate a sampling error of +3% at the .05 confidence level (Kalton, 1983). Conducting an experiment to generate such a safety index with a simulated manhole and a human subject (assuming four minutes per trial and a maximum of 90 minutes a day allocated to the experiment), it would take 46 days of effort to complete the required experiment with just one subject. With the RoboCane® software, these same 1,065 trials could be completed in approximately sixty minutes of computer time. If the mobility specialist were interested in changing a single variable such as a cane of different length or a less consistent stride length, the entire process would have to be repeated. This commitment of time and resources would be impractical with a human subject, but easily accomplished with RoboCane®.

What is the probability of a person falling into an open manhole 76 centimeters in diameter? What would be the best technique to suggest to a client of my size to reduce the probability of such an accident? How would you answer these questions? Do you have any evidence to base your answer on? These and other questions heretofore unanswered or given a best guess. RoboCane® in the hands of the mobility specialist adds science to the art of mobility instruction.

Conclusion

Because this mobility model utilizes the power and availability of the personal computer, coverage profiles and individualized mobility techniques can be generated by the instructors whenever they are needed. The speed and ease of use of these profile analyses will allow timely and accurate examination of the impact of mobility attribute changes on coverage. Another major contribution is the graphic recording of individual changes in mobility techniques. This form of accurate progress notation provides the most accurate means of communicating information to other mobility specialists. The objective measures also provide documentation for increased accountability, which results in improved quality assurance, increased capacity for training and monitoring professional staff, and diminished threat of liability.

Through adjustment of the input parameters, the mobility professional can use the proposed RoboCane® software to design and evaluate techniques and strategies to meet the mobility goals of the client. Increases in the population of older and multiply impaired clients make the use of individualized mobility strategies very important. By sharing the results of these analyses with the client, the mobility professional can provide comparative safety information crucial to the client's participation in the rehabilitation process and to his or her informed consent to the rehabilitation plan. By discussing the results with architects and designers, safer and more accessible travel environments can be designed, and in the US., the mandates of the Americans with Disabilities Act (ADA) can be met. In summary, because of its ability to rapidly evaluate many different techniques and strategies, the proposed RoboCane® can be used as a powerful learning and research tool for individuals with visual impairments, their families, mobility practitioners, researchers, and students, as well as architects and

other individuals concerned with optimizing access for people with disabilities.

Summary

Benefits of RoboCane®

- •Individualizing prescriptions of cane techniques
- •Accurately prescribing cane length
- •Evaluating new techniques
- •Designing optimum strategies and techniques for people with multiple impairments
- •Client records: quantification, documentation, evaluation of progress, accountability, and liability protection.
- •Emphasize objectivity, quality assurance, program evaluation
- •Facilitates communication with the visually impaired learners, clients' families, with other O&M professionals, and with other disciplines.

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USING MICROCOMPUTER SIMULATIONS TO ENHANCE SPATIAL ORIENTATION OF CONGENITALLY BLIND TRAVELLERS

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The ability to wayfind and update one's spatial perspective is facilitated through the use of visual perceptual input (Rieser, Guth, & Hill, 1986). Acquiring large-scale spatial knowledge is made simpler when the wayfinder is able to procedurally monitor his or her position within space visually. For individuals with visual disabilities however, the task of wayfinding, particularly in novel environments is more complex. Because of this individuals with visual disabilities often find it necessary to utilize maps and verbal assistance to assist them in the wayfinding process. Orientation and mobility specialists utilize a number of instructional strategies and materials to assist the wayfinder with visual disabilities to obtain large-scale spatial knowledge.

Recently, manufacturers and researchers have begun to demonstrate the effectiveness of using devices containing microchips to enhance the spatial layout knowledge of persons with and without visual disabilities. Software used to develop tactual graphs and charts for science and math projects are also useful for developing tactual maps of select large-scale environments. Other auditory-tactile devices, such as the NOMAD, produce refreshable tactile lines and symbols for easy map making.

<u>Microcomputers and the acquisition of spatial knowledge of blind travellers</u>
An initial investigation into the use of microcomputer simulations for orientation and mobility purposes began in 1987 and was later published in the <u>Journal of Visual Impairment and Blindness</u> in 1990. The purpose of the initial investigation was to compare the effectiveness of using a tactile graphic aid and a microcomputer simulation on the spatial layout learning of congenitally totally blind travellers. More specifically, the study examined whether congenitally totally blind travellers could learn the spatial layout of nine landmarks in an outdoor 5 X 5 block residential neighborhood, by interacting daily with a tactile graphic aid and microcomputer simulation of outdoor novel space. The two 5 X 5 block residential neighborhoods were unique in that all 25 blocks were arrayed in a predictable, rectilinear fashion, thus making the exploration task somewhat easier. For 26 days, each participant interacted with either the microcomputer simulation or the tactile graphic aid for 15 minutes per

session. The model of simulation varied across the 26 days but each person explored the microcomputer simulation for 13 days and the tactile graphic aid for 13 days.

Each session on the microcomputer involved the use of a joystick and software written especially for this project. Study participants moved the joystick at right angles in order to move the simulation "forward", "backward", "right", or "left". As they moved the joystick an Echo II speech synthesizer provided verbal feedback regarding type of move, position, and location within the simulation. On the tactile graphic aid, each participant tactually explored the 5 X 5 block grid in order to locate the nine landmarks. Each landmark in both the microcomputer simulation and the tactile graphic aid had a distinctive texture or tone associated with its location in order to provide the participant with a tool to remember the landmark location within the simulation.

In 1992 a second investigation into the use of microcomputer simulations for orientation and mobility began, the results of which have been submitted for publication. The purpose of this study was to determine whether congenitally totally blind and sighted blindfolded individuals could acquire spatial layout knowledge of an unpredictable, nonrectilinear large-scale space, using a microcomputer simulation of that space. The novel space chosen for this study was a large-scale indoor environment on a college campus. The goal of the simulation was to locate six landmarks which were arrayed in a similar manner to the landmarks in the previous study. As with the previous study, each participant explored the microcomputer simulation 15 minutes per day for 15 days.

Measuring spatial learning on the simulations

To measure spatial learning, the experimenter used a number of dependent measures used in previous research (Guth, Hill, & Rieser, 1989). In both studies, triadic distance comparison measures and straightline pointing measures were used. Triadic distance comparison involves the decisions made by the participant between three given landmarks within the simulation. The participant was to choose which two of the three were closer together and which two were farther apart. Point values were assigned to each response. If both closeness and farthest were correctly identified then two points were marked. If only one or the other were correctly identified, then one point was assigned. If none of the distance were correctly identified, then zero points were assigned. The second dependent measure assessed the participants ability to imagine a straightline from one landmark to another. This euclidean judgement was based on the participants ability to view the entire neighborhood simulation

from an aerial perspective. When presented with a beginning landmark and facing direction, the participants turned a pointer in the direction they imagined the ending landmark location to be. These overall mean degree scores were then analyzed with two more sensitive measures based on variability error and constant errors.

A third dependent measure used in the initial study but not in the follow-up study was an outdoor route planning measure. In this measure, each participant was taken to the actual neighborhood environments in the community upon which the simulations were based. Once there, they were asked to complete triadic distance comparison and straightline pointing measures. In addition, they were asked to plan three routes from one landmark to another.

Results

Results indicate that although the acquisition of spatial layout knowledge was faster using the tactile graphic aid in the initial investigation, the accuracy of spatial judgments (i.e., triadic distance comparisons, pointing error scores) between both simulations was equal. Spatial learning occurred sooner with the tactile graphic aid but was as accurate with the microcomputer simulation over time. Participants obtained similar absolute mean, variable and constant pointing error scores across both conditions. Of particular interest were the judgements made in the outdoor route planning measure. Only one of the participants was unable to functionally plan a route to locate one of the ending landmark locations. The remaining participants were successful at travelling to and locating all three landmarks.

The 1990 study utilized a large-scale space that was predictable. That is, movements within the simulation were based upon a true rectilinear grid pattern. In the more recent study, the space which was simulated was not as predictable or rectilinear.
In this study the results of both the triadic distance comparison scores and the straightline pointing scores were similar to the results of these two measures in the initial investigation. That is, over time accuracy of spatial learning improved. The results of these two studies generally support the acquisition of spatial layout knowledge of this type. In some cases participants who were congenitally totally blind achieved higher triadic distance comparison and straightline pointing scores than participants who were sighted but blindfolded.

Implications for orientation and mobility instruction

The total amount of time it took each participant to complete the

exploration of each microcomputer simulation was 3 hours and 15 minutes. For some participants, however, acquisition of spatial knowledge occurred in much less time. One obvious benefit to using microcomputer simulations is efficiency. Orientation and mobility specialists could supplement many hours of introductory foot travel familiarizations with time spent on a simulation of that space. To assess the accuracy of that knowledge, the O&M specialist could conduct a drop-off in the actual space; and if necessary, make corrections at that time. After the individual becomes more familiar with the overall layout of the space, and the position and locations of relevant landmarks in that space, then the O&M specialist can introduce more complicated information (e.g. complex street crossings) to enhance the travelers knowledge and safety.

Another benefit to using the simulation is the settings or the places in which the simulations would be conducted. Interaction with the simulations would need to occur indoors, in a controlled environment. This would provide the individual who is blind and not too aggressive of a traveler, to concentrate more on the spatial layout of the environment, and less on other conditions in the actual space (e.g. traffic noises), which may impede the individuals learning of that space. Of course there is no substitute for the real environment, but using the simulation first would be a comfortable way to introduce this individual to complex or anxiety provoking settings. It may even be possible, given the advancements of portable lap-top computers, to run the simulation on one of these systems in the actual space. For example, when conducting mall travel familiarizations. The general spatial layout of the mall could be introduced in a more controlled setting, but once the general layout has been introduced, the lap-top could be used to learn the location of stores within the mall. Providing yet another tool for the O&M specialist to use in the field.

In conclusion, the results of the studies reported above demonstrate the value of using microcomputer simulations for enhancing large-scale spatial layout knowledge of predictable and unpredictable spaces of persons with visual disabilities. As the use of the microcomputer increases within the community of individuals who are blind, the need for applications such as the project reported above are beneficial and timely. It is not, however, the intent to replace O&M specialists with machines. Nor is it the intent to advocate for the elimination of one-on-one familiarization exercises. Rather, it is to increase the avenues which afford the client and instructor a variety of methodologies for acquiring novel spatial knowledge safely and accurately.

THE CORRELATION BETWEEN THE PREFERRED AND PHYSIO-ECONOMICAL WALKING SPEED OF THE VISUALLY IMPAIRED PUPIL RECEIVING MOBILITY AND ORIENTATION TRAINING

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Research has shown (Cotes and Meade 1960, Maruyama and Nagasaki 1992) that when a person with normal vision walks at his preferred walking speed, he will cover the maximum distance per oxygen consumption (m/ml O_2/kg) and his speed will therefore be physiologically economical. Blind children seldom, if ever, have the opportunity to walk at their preferred walking speed (PWS) and are subjected to the preferred walking speed of the parent or the friend who escorts them Furthermore, independent locomotion of young blind children occurs over relatively short distances and it is therefore difficult to develop a normal walking pattern (Rosen, 1986, Kobberling et al , 1989, Velasco, 1992) and a economical walking speed. Children who became visually impaired at a later stage in their lives were able to develop a normal walking pattern and a economical walking speed in the years prior to their blindness

A preferred walking speed is important not only in terms of economy but also because it can be used to measure the child's progress in mobility and orientation and to evaluate an electronic travelling aid such as the Sonic Pathfinder (Clark-Carter, Heyes & Howarth, 1986). In determining the PWS (according to the Heyes Clark-Carter method) of pupils undergoing mobility and orientation training, it was found that there was a significant variance in the preferred walking speed of some pupils Consequently further research was undertaken in respect of the correlation between the preferred walking speed and the physio-economical walking speed

SUBJECTS

Visually impaired pupils who were receiving mobility and orientation training were used as subjects (N=21) These pupils were divided into two groups. those who were completely blind or who could perceive only light

before the age of six years, and those who became blind or who could perceive only light after the age of six years. The age of six years was selected as pupils would attend a school for the blind at that age and consequently could be exposed to movement programmes. The pupils were further divided into those who had been receiving formal mobility and orientation training for a year and a half, and those who had had only sighted guidance. The ages of the pupils ranged from 11 to 20 years.

METHOD

The PWS speed was measured over a distance of 50m in an open corridor which the pupils used daily. The PWS of each pupil was taken six times in a period of 35 minutes. There was no movement by any other pupils during that period and the pupils could concentrate on his own preferred walking speed. The pupils were not aware of the fact that their time over the distance was being taken.

The PWS of the pupils (N=21) was again determined on a treadmill with which they were familiar. After the pupil had been subjected to various speeds from 2 to 6km/h, he himself could set the speed which he preferred.

After the pupils had on two occasions, been familiarised with the apparatus in a biokinetics laboratory each pupil's economy of movement (m/ml O_2/kg) was determined while walking on a treadmill at speeds of 2-; 3-; 4-; 4,5-; 5-; 5,5- and 6 km/hour.

RESULTS

The variance distribution in the PWS of the total group of pupils can be illustrated graphically as follows:

FIGURE I

This low to high variance was the reason for further research.

If the pupils were divided into the groups blind for a *short period/long period* and *received /did not receive* mobility and orientation training, the following variance distribution between the groups is evident:

FIGURE II

There was a significant difference between the two groups in the two

categories of blindness ($p<0,097$) and mobility and orientation training ($p<0,024$).

The supposition that children who still had their sight before the age of six years could learn an economical speed of locomotion, is confirmed in the following graphic presentation. The economy of movement is expressed in terms of meters covered per ml O_2 per kilogram of body weight used.

FIGURE III

When the total group's PWS in the corridor, on the treadmill and their calculated economical speed are compared, the results are as follows:

FIGURE IV

There was a significant difference between the preferred walking speed on the treadmill and the economical speed ($p<0,01$). There was also a significant difference between the PWS and the economical speed ($p<0,01$). It should be noted that the most economical speed for the group was 4,9 km/h.

If these results of the economy of locomotion are compared with those of similar research (Clark-Carter, 1986), the profiles are as follows:

FIGURE V

The two graphs show the same trend, but the study under discussion reflects a higher level of economy of locomotion.

A comparison between the PWS in the corridor, on the treadmill and the most economical speed of the individual pupil with the smallest and the pupil with the highest variance (PWS in corridor) can be made by respectivelly collating Figure VI and Figure VII.

FIGURE VI

FIGURE VII

A subsequent study investigated the preferred walking speed of three pupils who had completed their mobility and orientation training and who had undergone Sonic Pathfinder training. As in the case of the experimental study, the PWS in the corridor was recorded after the pupils had completed their mobility and orientation training, and again after they

had undergone training in the use of the Sonic Pathfinder. The pupils used the Sonic Pathfinder when the PWS was recorded. The following trend was evident:

FIGURE VIII

In the case of two pupils there was a significant decrease in the preferred walking speed variance (P<0,01 respectively). Initially it was assumed that this variance would stabilise after mobility and orientation training, but this was obviously not so where those two pupils were concerned.

SUMMARY AND CONCLUSION

This research has shown that the distribution variance in the PWS was caused by underlying factors. It was found that young visually impaired children had difficulty in determining their PWS. This could be attributed to the fact that, owing to their blindness they had not had the opportunity to develop a PWS. Children who became visually impaired after the age of six years did have the opportunity to develop a PWS. Whether the period of blindness has a influence on the PWS would have to be the subject of further research.

Visually impaired children should be encouraged to move independently and at a greater walking speed. Mobility and orientation training does have a positive effect on the walking speed of the pupil, and the research has shown that a PWS can be developed even though it is not the objective of the training.

Movement is an interaction with the environment during which stimuli and information are processed. A treadmill frees the pupil from this interaction and one would assume that the pupil would be able to concentrate more on his PWS and would want to walk faster. However, the opposite was found, as the PWS on the treadmill differed significantly (p<0,01) from the faster PWS walking speed. Consequently results obtained in the actual movement environment are more reliable.

In spite of the size of the group used to determine the preferred walking speed (N=21) and the economy of locomotion (N=13), it is important for the orthopedagogue to assess the pupil as an individual.

In the case of the three pupils who used the Sonic Pathfinder, a decrease in the PWS variance was found. This decrease could not be explained and one can only speculate on the reasons for it. As the pupils used the side sensor of the Pathfinder, the wall was picked up and this resulted in a continual rhythmic signal. This signal could have had an influence on the walking rhythm of the pupil assist the latter to maintain a more steady walking speed, with a resultant decrease in PWS variance. Further research and larger groups might explain this aspect and the therapeutic value of an electronic travelling aid such as the Pathfinder could be investigated.

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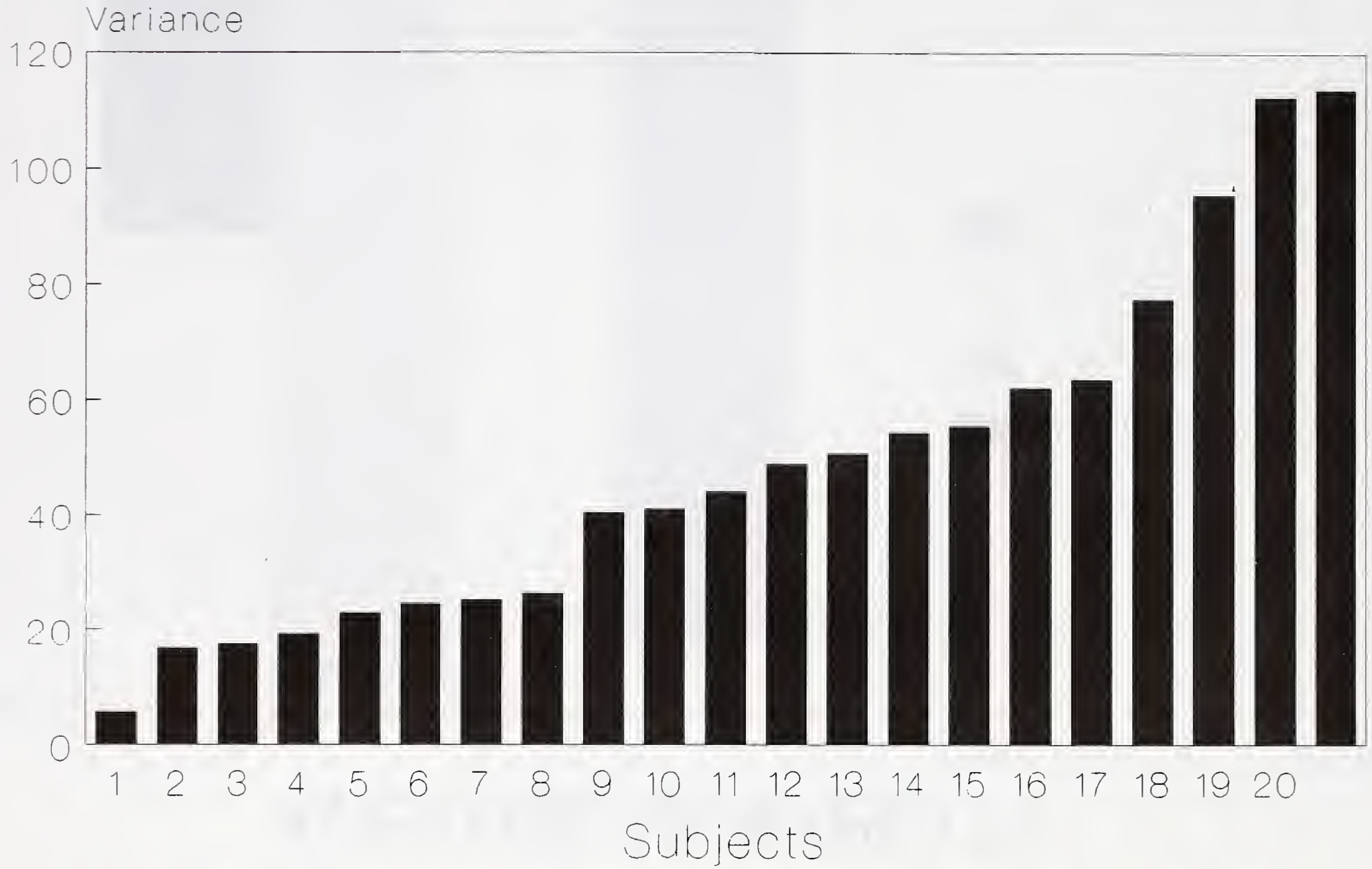
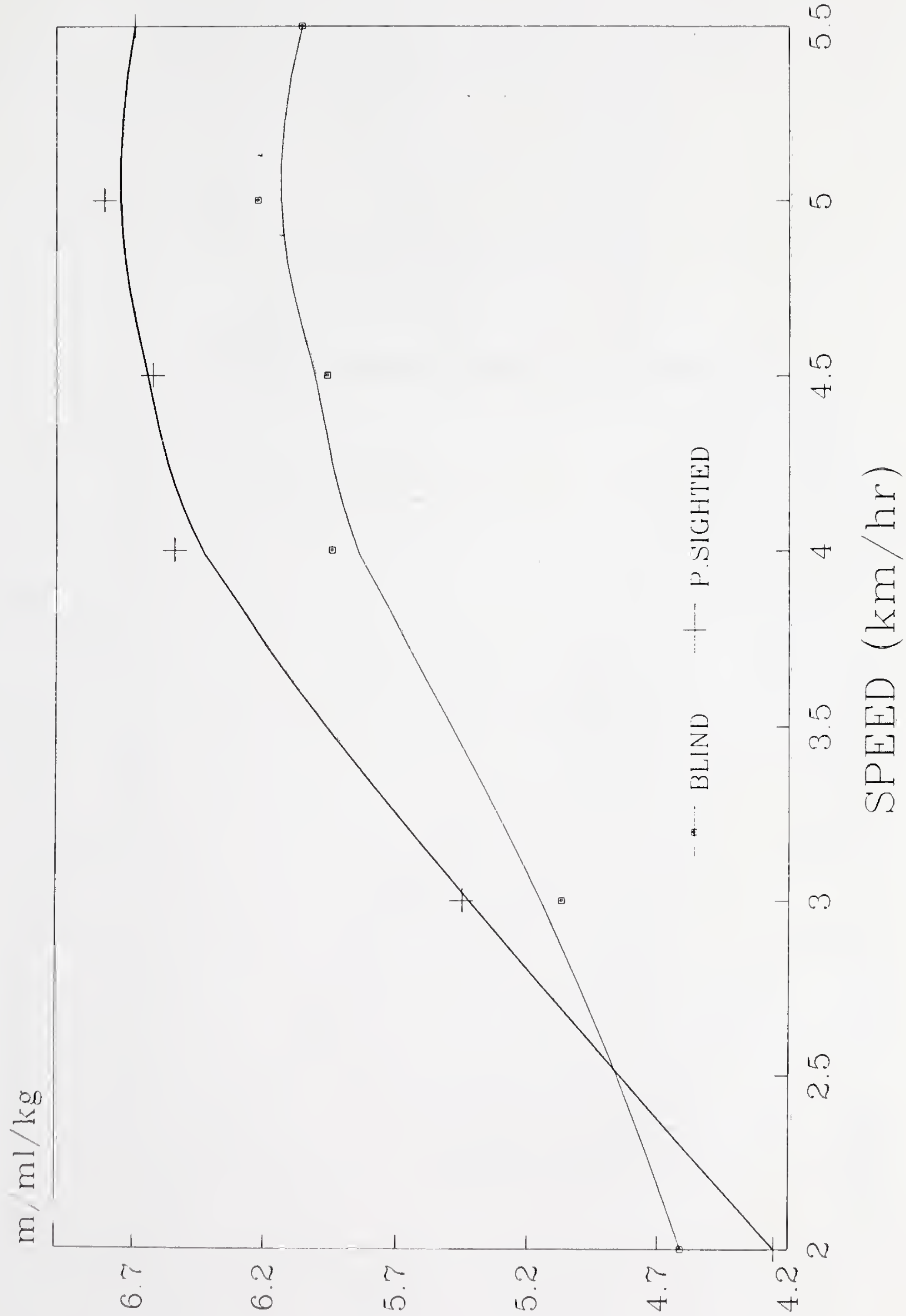
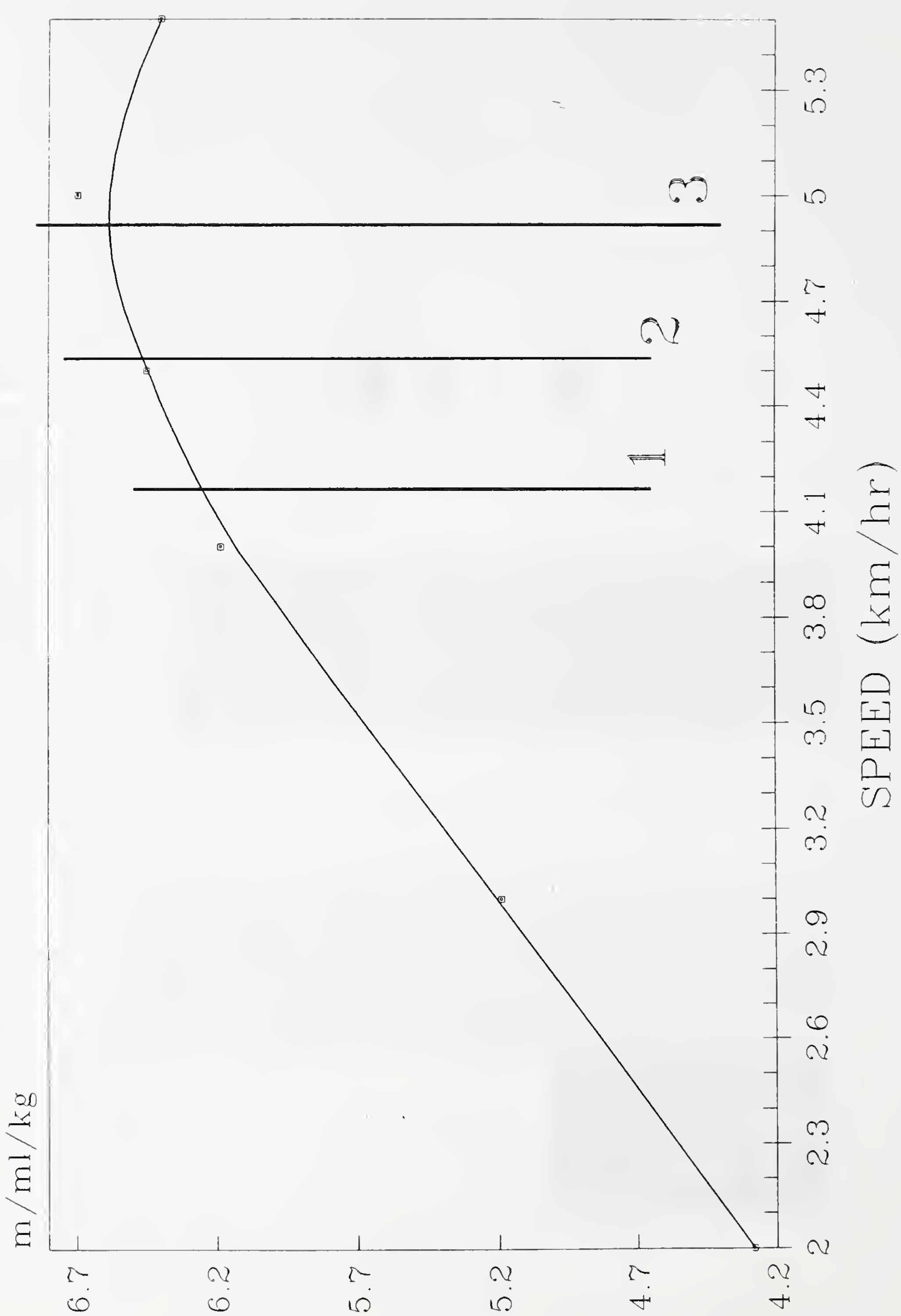
VARIANCE DISTRIBUTION
TOTAL GROUP (N=21)



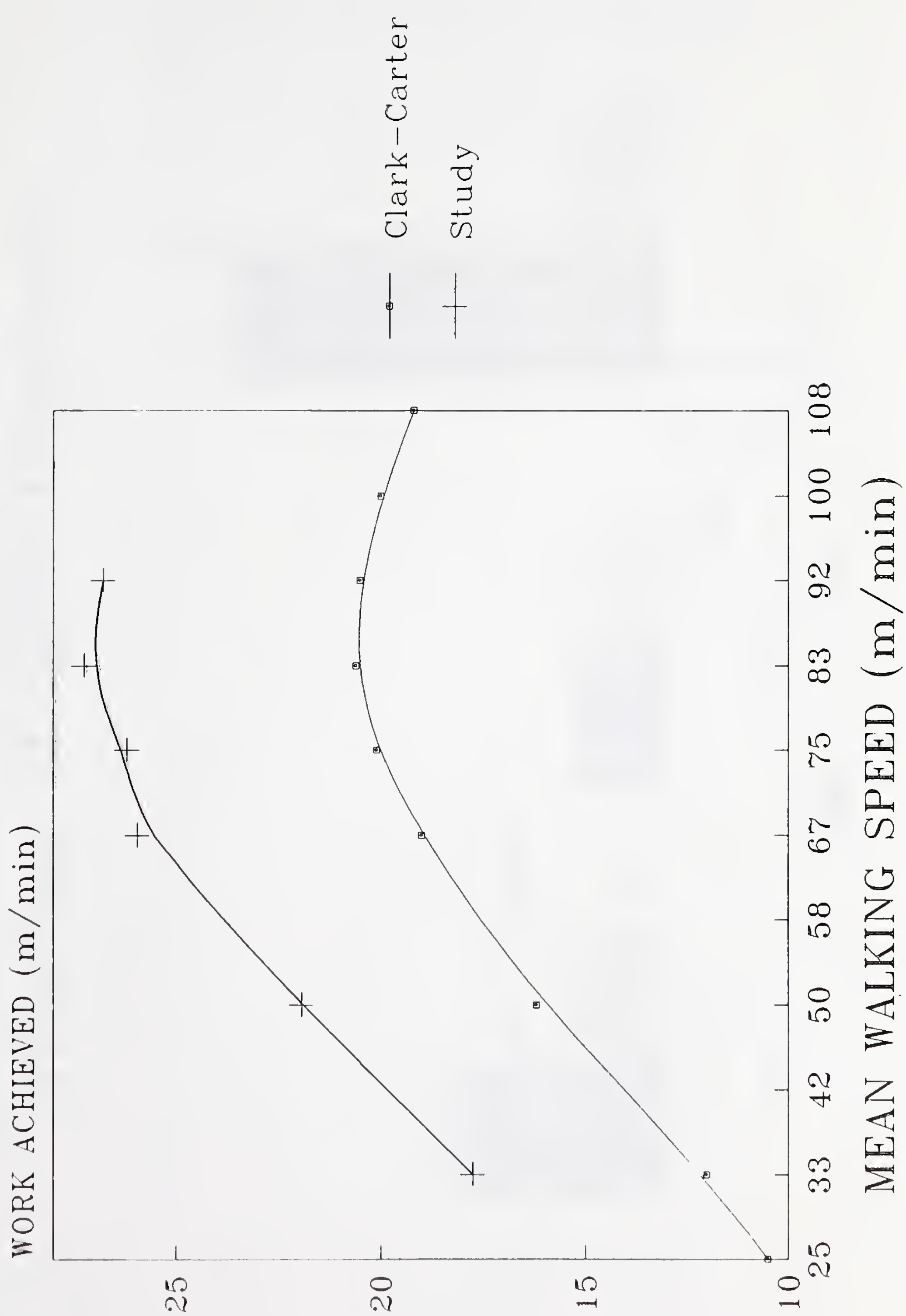
VARIABILITY BETWEEN GROUPS

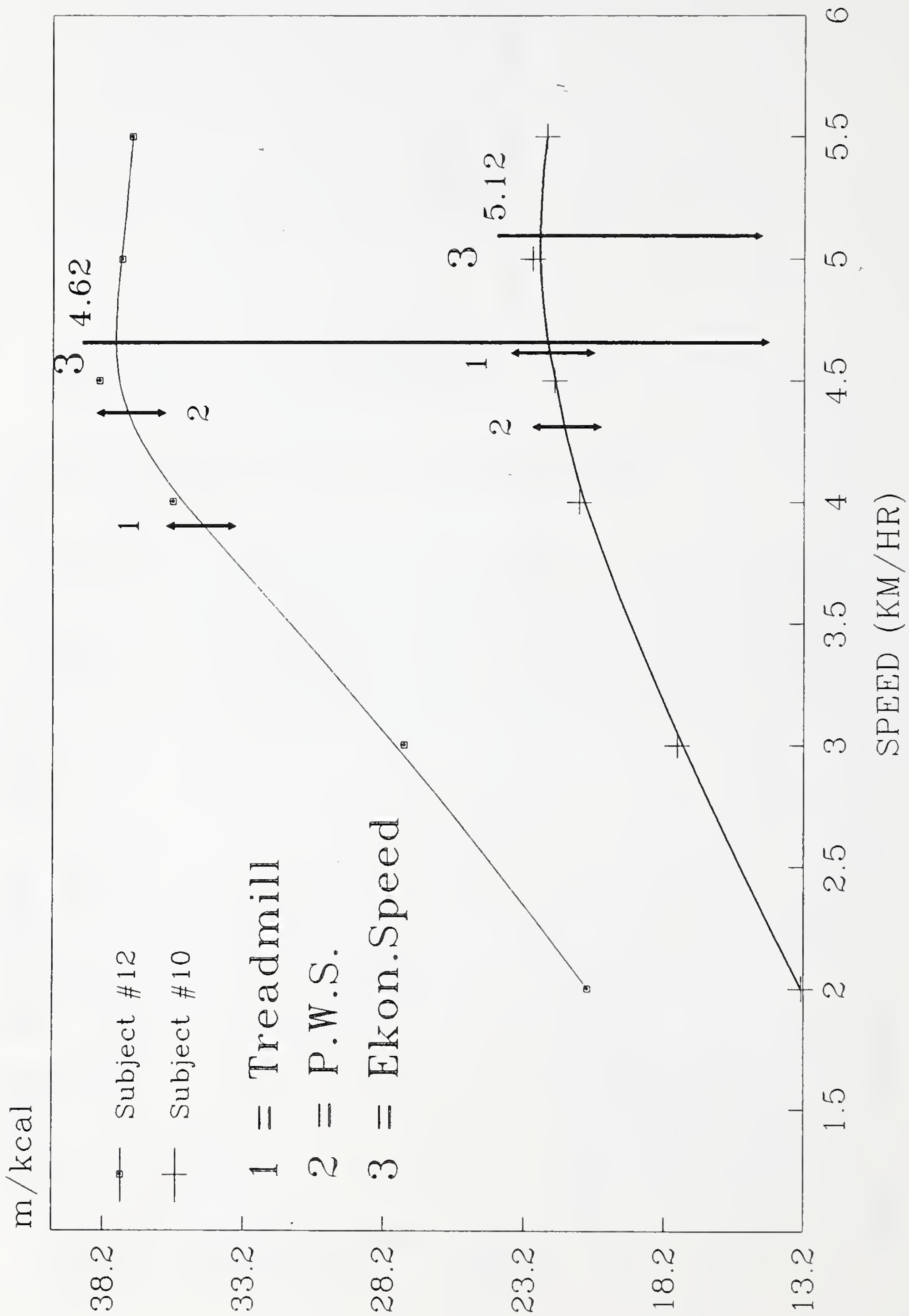
AVERAGE VARIABILITY


m/ml/kg
6.7
6.2
5.7
5.2
4.7
4.2
2
2.5
3
3.5
4
4.5
5
5.5
BLIND
P.SIGHTED
SPEED (km/hr)



m/ml/kg
6.7
6.2
5.7
5.2
4.7
4.2
2
2.3
2.6
2.9
3.2
3.5
3.8
4.1
4.4
4.7
5
5.3
1
2
3
SPEED (km/hr)

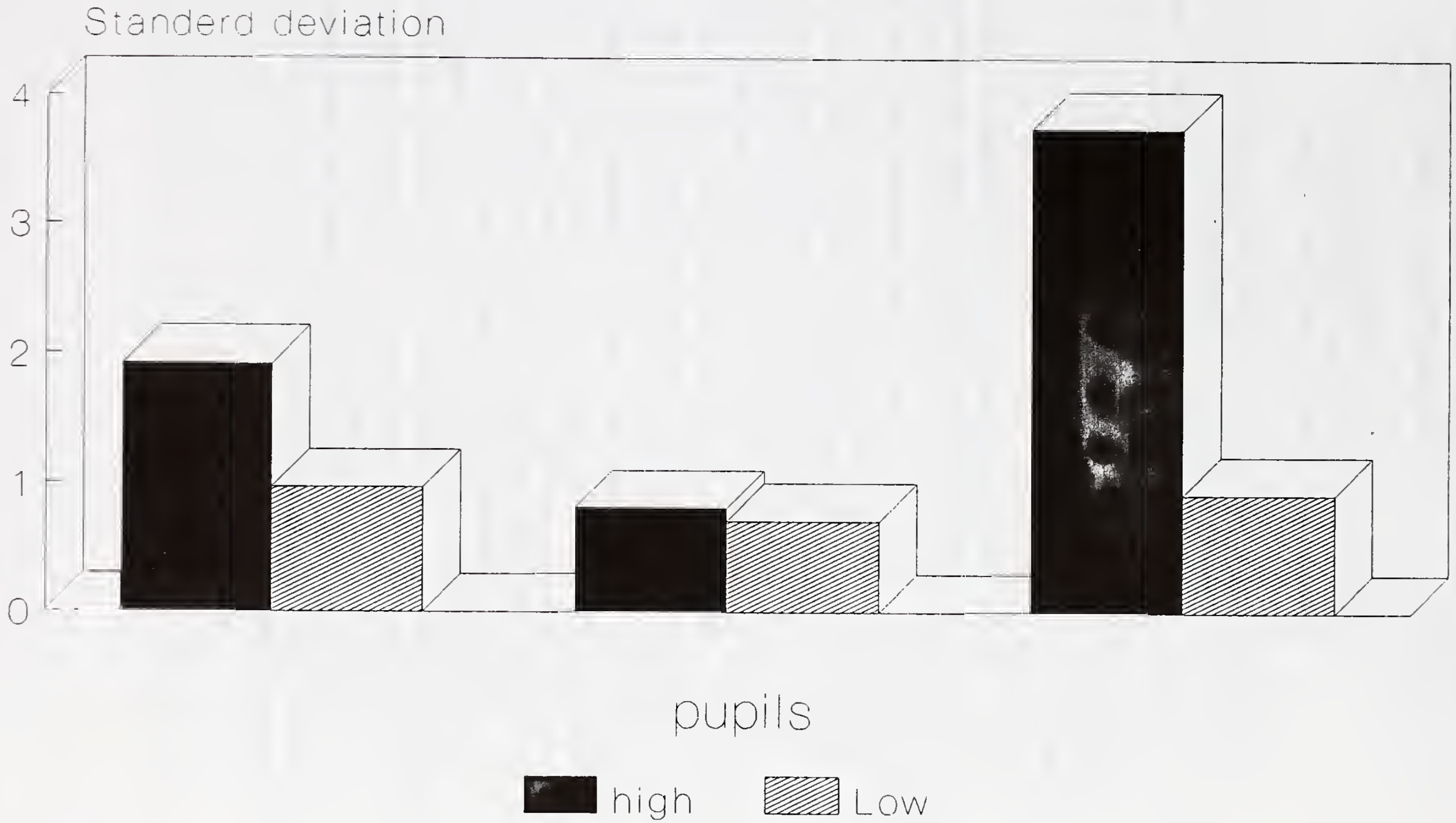

WORK ACHIEVED (m/min)
10
15
20
25
25
33
42
50
58
67
75
83
92
100
108
MEAN WALKING SPEED (m/min)
Clark-Carter
Study



m/kcal
38.2
33.2
28.2
23.2
18.2
13.2
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
SPEED (KM/HR)
Subject #12
Subject #10
1 = Treadmill
2 = P.W.S.
3 = Ekon.Speed
4.62
5.12

PREFERED WALKING SPEED

Influence of Sonic Pathfinder



High= After M.O. training
Low= After Pathfinder training

A TECHNOLOGY AND PROBLEM SOLVING APPROACH TO ORIENTATION AND MOBILITY EDUCATION

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The preparation of Orientation and Mobility instructors to teach visually impaired persons to travel independently is exceptionally time intensive. The highly specialized training requires a one-on-one faculty-student ratio in some courses. This ratio is necessary for the acquisition of orientation and mobility skills, practicing techniques for teaching visually impaired persons, and understanding the problem solving activities involved in the process of nonvisual travel.

Field-based performance experiences are built around blindfold simulation activities which for the most part require a one-on-one instructor-student ratio. This ratio facilitates student learning as well as the safety of the individual. A major objective of student instruction is the design of teaching strategies and selection of environments that result in generalized learning. That is, after initial learning within a limited context, learning will be applied to similar yet novel contexts. The backbone of O&M teacher training is simulation. Simulation is necessary in order to provide students with a controlled set of experiences reflecting the difficulties and skill requirements of visually impaired individuals. During simulation experiences students are often blindfolded or given vision reduction glasses and then are provided with simulation experiences which replicate experiences common to the visually impaired traveler (e.g., street crossings, accessing public transportation , locating unfamiliar objectives, etc.). It is expected that the student will generalize from their simulation experiences to unique applications when they leave the university and become independent teachers. Unfortunately, many simulations that students experience are limited because of time constraints and the physical location of their university program. For instance, some programs are not able to teach independent travel in winter conditions while others do not have subway systems available for instructional purposes.

Field based simulations are augmented with classroom based presentations and discussions designed to facilitate generalization. Successful approaches for facilitating generalization depend on identifying selected training examples that have characteristics similar to many different examples of a concept (Becker, Engelmann, & Thomas, 1975; Horner & McDonald, 1982; and Dee, Hupp, & Hill, 1986). One strategy for selecting initial training examples is based on the best example theory of categorization (Rosch & Mervis, 1975). The best example theory states that categories of information have a core of examples that are highly representative of the category. These examples have many attributes in common with other members of the category (family resemblance principle) and share few attributes in common with members of other categories (contrast set principle). As such, they are recognized as members of their category. Typically, these examples are referred to as "good examples." For instance, standard, four-door sedans are considered good examples of the category car. Emanating from this core of good examples are other less representative members of the category. These examples have fewer attributes in common with other members of the category and are less readily recognized as being members of the category. These are referred to as "moderate" and "poor" examples. For instance, Volkswagen "beetles" and Chevrolet Corvettes are less representative of the category "car" than are standard sedans (Dee et al., 1986). The challenge of educating O&M instructors is to provide them with enough "good" example experiences so they can generalize to situations which could be considered "moderate" or "poor". To further facilitate the use of good examples for learning and foster the ability to discriminate between these good examples and moderate or poor examples, univerities in academic and professional training programs have realized the advantages and efficacy of a relatively new medium of instruction: interactive video. The effectiveness of interactive video in instruction has been examined by a number of researchers but perhaps the most comprehensive examination has been done by Fletcher (1989). Under Congressional direction for the Institute for Defense Analysis, Fletcher conducted a meta-analysis of 47 empirical studies designed to examine the effectiveness of interactive video instruction. He examined effectiveness, the time on task, retention and overall applicability to current and future training requirements in military, industrial and higher education settings. According to Fletcher, the results of the meta-analysis support the

conclusions that the use of interactive video was more effective as a teaching tool than conventional instruction and that retention under interactive video is a least equal to or greater than that found under other instructional approaches.

Videodisc technology allows multiple examples of scenarios of training situations and demonstrations to be recorded on one videodisc. Once the scenarios are recorded they may be accessed and shown in either a linear form, as they were recorded, or as vignettes created by "cutting and pasting" portions of multiple scenarios into unique continuous displays of targeted "good " examples. These hypermedia-videodisc instructional materials may be used for both direct knowledge acquisition and problem solving activities. The direct advantage of the development of this technologically innovative approach to O&M instructor education is that it is time and cost effective. Many experiences and situations may be presented to students that are not economically feasible to simulate or experience in this environment. In addition students can be provided with problem solving activities which are time consuming to simulate and frequently done in a one-on-one teaching situation. Not only will trainees receive a more refined and inclusive training program but an institution of higher learning will realize a time and cost saving through a decrease in the amount of time required for classroom presentations and field based simulation activities.

This demonstration project focused on the methods of residential street crossings and recovery methods and involved a number of steps in its production. The first step was a task analysis of the procedures involved in a typical residential street crossing, including the procedures for recovering from a veer. Next, a design worksheet was constructed to provide a "roadmap" to developing the courseware. (The worksheet provided a detailed description of each instructional sequence, the instructional objective, a statement of the contents presented in each part of an item, and the format in which the item would be presented.) In the next phase, two tasks were completed: the videotaping of street crossings at a residential intersection, including recovery methods and possible errors in recovery, and the authoring of the actual computer courseware using the Quest Authoring Program. The Quest system is an integrated set of programs used to create, present, and manage computer-based training courseware. Quest

allows for the incorporation of video, still images, animation, color options, and a variety of fonts into a lesson.

The next step was the transfer of video-tape sequences to a "scratch" video disc. Finally, the specific frames and sequences on the videodisc to be used in the course were selected and incorporated into the courseware. Students then viewed the lessons and interacted directly with the courseware by selecting nemu options and answering questions. As students viewed the various sequences and made decisions about the correctness of a decision, they could then veiw the results (consequences) , via the videodisc, of that decision. For example, the student views a segment from the video of a cane traveler veering into the parallel street and is then presented with options for recovery methods and asked to select the correct option. The program then runs the video segment showing the consequences of the student's selection, e.g. , turning 90 degrees to locate the correct curb instead of overturning 90 degrees and continuing to travel in the parallel street.

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ASSESSMENT AND TRAINING OF BLIND PEDESTRIANS' ABILITY TO MAINTAIN A STRAIGHT PATH

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To maintain a straight path of travel, blind pedestrians often rely on information afforded by the physical and acoustic features of their surroundings. A wall, for example, can be used as a guideline by maintaining physical contact with it with the long cane or the hand, or by maintaining auditory contact with it via the sounds it reflects. Physical features are sometimes added to an environment specifically to facilitate straight-path travel. Examples of this are the "braille block" pathways in the train and subway stations of Japan and Taiwan, and the raised guide strips that direct blind pedestrians across irregular intersections in some cities in the United States.

A sound source such as an audible traffic signal can facilitate straight-path travel by directing a pedestrian toward itself via interaural and sound gradient cues. Sound sources are also useful because they transmit information about a pedestrian's spatial relationship to critical features of the travel environment. Traffic on a busy street, for example, can be used to continuously monitor one's distance from the street and thereby to walk parallel to it.

Although many travel environments are rich in such sources of information, many others are not. Physical cues are often unavailable, for example, when walking along parking lots or across streets and large open rooms. Sound cues

are often intermittent; even at major intersections, there are usually periods with little or no traffic. Proprioception alone does not appear to be sufficient for the detection of veer from an intended straight-line path. For example, under conditions in which environmental cues were inaccessible, Cratty & Williams (1966) found that blind subjects performed at chance levels when judging whether a curved path with a 13 m radius was straight or curved.

Veering from a straight-line path can (a) create risky situations such as unintended walking into streets and parking lots, (b) substantially reduce the efficiency of travel, (c) result in disorientation, and (d) interfere with the learning of object-to-object relationships. To illustrate the latter problem, consider a blind pedestrian who believes herself to have traveled a straight path between two objects but who has, in fact, traveled another path because she veered from her original trajectory. Her "knowledge" of the spatial relationship of the two objects would therefore not reflect their true relationship.

A related paper (Guth & LaDuke, in press) reviews the research literature pertaining to the "veering tendency" and concludes (a) that despite over a century of study, scientists are far from a satisfactory explanation of this phenomenon, and (b) that much of the available data is of little practical use to O&M instructors. To address the needs of O&M instructors, we conducted a series of experiments designed, first, to assess the spatial characteristics of individuals' veer over multiple trials and multiple test sessions and, second, to attempt to reduce the veer of persons who exhibit a severe and consistent pattern of veer.

The results of single-session experiments in which similar veer has been found across multiple trials have been used to argue (e.g., Strelow, 1985) that a blind pedestrian can compensate for his or her veer by making periodic adjustments in walking direction. This argument rests on the untested assumption that veer is consistent over time in both direction and magnitude. In Experiment 1 we explored this possibility by assessing the ability of 14 adults who were blind and of 7 blindfolded O&M instructors to travel a 25 m straight-line path on three 15-trial sessions. These outdoor test sessions, during which auditory-spatial cues were eliminated with an FM system, were separated by intervals ranging from 1 day to 1 week. Subjects were filmed as they walked across a level asphalt surface that was marked with a rectilinear grid. The grid enabled us to identify a subject's location to the nearest 10 cm at 7 places along each path walked. Although many subjects were consistent in their direction and magnitude of veer across the 15 trials of a single session, most subjects were inconsistent across sessions along one or both of these dimensions.

Experiment 2 was a training study conducted in a large indoor exhibition hall with 5 blind adults who were found to exhibit a severe and directionally consistent veering tendency across 4-14 baseline sessions. Following these no-feedback baseline sessions, subjects underwent 12-20 training sessions. During the 20 trials of each training session, a subject "squared off" to a wall (see Jacobson, 1993) and then attempted to walk a 20 m straight-line path perpendicular to the wall. One meter to either side of the desired path and parallel to it was an infrared beam. When either beam was broken by a subject's leg, an alarm was triggered that identified the direction of veer. Each training

trial ended at this point and the subject was informed of the distance that he or she had traveled before breaking the beam.

Subjects were surprised by their habitual patterns of veer revealed by the feedback, were highly motivated by the training procedure, and described the training experience as relearning what it should feel like to walk straight. The training procedure substantially reduced veer and follow-up tests revealed that the effects of training were maintained over the 5-6 month period after training was discontinued.

During Experiments 1 & 2, we observed that the technique of squaring off did not always produce the desired initial walking direction. Therefore, in Experiment 3 we assessed the accuracy of four methods of nonvisually establishing a walking direction, including squaring-off, trailing, and two methods of using a "straight ahead" sound source. The imprecision with which these techniques were executed by some subjects suggests that O&M instructors should provide many opportunities for practice and feedback when they introduce such techniques to their clients.

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HIGH RESOLUTION CCDS AND THEIR USE IN MOBILITY DEVICES

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ABSTRACT

CCD (Charge Coupled Device) images, such as those produced by a standard V8 video camera, are spatially high resolution and are potentially useful for aiding blind people in mobility tasks. Unfortunately the format and amount of raw data present in these spatio-temporal images make them unsuitable for direct presentation to the user. We present an algorithm for extracting an uncluttered depth map from these images which is displayed to the user as a series of stereo-audio tones in which frequency encodes distance and Inter-Aural Amplitude Difference(IAAD) encodes direction in the azimuth. The display can be easily extended to include altitude information by time multiplexing the output. In this scheme a sequence of audio images, each representing a different height in space, is sequentially presented to the user. A unique lens attachment enables the simultaneous capture of multiple views of the scene in a well determined, known configuration which greatly simplifies subsequent processing. A 1-D gradient calculation is used to compute depth from the scenes.

1 Introduction

The raw images produced by CCD cameras are similar in many ways to those transduced by the human retina. Each surface point in space is represented in the image by a signal which designates its brightness. However, this 2-D projection of the 3-D world

contains no understanding of the scene such as the recognition of objects, their spatial arrangement or their ultimate significance in the context of danger to the user. It requires far more processing power than is presently available to extract human-like perception from such images. Even if it was feasible to carry out the necessary computation it would be impossible to convey the results to a blind person over one of their remaining senses, such as hearing or touch. The old saying that "a picture is worth a thousand words" holds true here. The contents of standard video rate images, which are being updated 25 times per second, would require a large number of words to convey. Clearly we require a scheme to condense the amount of detail to be conveyed to the blind user without losing any of the crucial information. Of most importance is to retain information about the location and distance to potential hazards, thereby enabling the user to plan ahead and take evasive action.

Strategies employed in previous mobility devices have ranged from those that present all the raw intensity data directly to the user to those that present only the distance to the closest object detected within a broad field of view. The present device detects the location and distance to all obstacles in a wide field of view and selectively presents them to the user as stereo-tones. The criteria used to select which and how much information is presented are fully controllable and can be altered to suit a particular situation or user.

This scheme has been implemented using a CCD camera connected to an IBM 286 PC equipped with an array processor. It is capable of providing the range to objects in a scene at a rate of 10 frames per second within a two-dimensional patch, with a range resolution of 10 per cent and a directional resolution of 1 deg.

2 Measuring Range via Motion Parallax

Motion cues provide a very rich and easily exploitable source of range information which is independent of high level knowledge. Flying insects have been shown to use this as their primary cue to gauge distances to objects[9]. When an eye, such as an insect eye or a video camera, undergoes translatory motion, the rate of image motion on the retina is dependent on the distance to the objects being imaged. By restricting the translation to be perpendicular to the optical axis of the eye, the image motion generated is inversely proportional to the distance to the object. We can compute image motion from this spatio-temporal image sequence using a gradient scheme, which relies only on local spatial and temporal intensity changes in the image brightness function[5, 1, 3, 8, 7]. From this the depth at each point in the scene can be computed.

In practice, however, it is difficult to control camera motion precisely to a linear translation as required above, especially a hand held or head mounted camera which is likely

to undergo erratic movement due to the motion of the user. These problems can be circumvented by using multiple cameras, fixed relative to each other. Consider any two images captured at a temporal sampling rate of Δt, by our camera that is moving at a speed s. The distance the camera travels between image captures is $\Delta x = s\Delta t$. If we fix identical cameras a distance Δx apart, with their optical axes parallel, we can capture a set of views that is almost identical to those captured from a single moving camera. The two sets of images may differ, but the latter sequence corresponds to the ideal situation because it is immune to changes in illumination and to ego-motion of objects within the scene. It is also invariant to erratic camera motion during image capture because both views are affected identically. Furthermore, the mechanical setup is simpler because no actual camera motion is required. In this scheme, we refer to the image motion between views as **virtual image motion**. Virtual image motion can be computed using the same gradient scheme that was discussed above for temporal sequences.

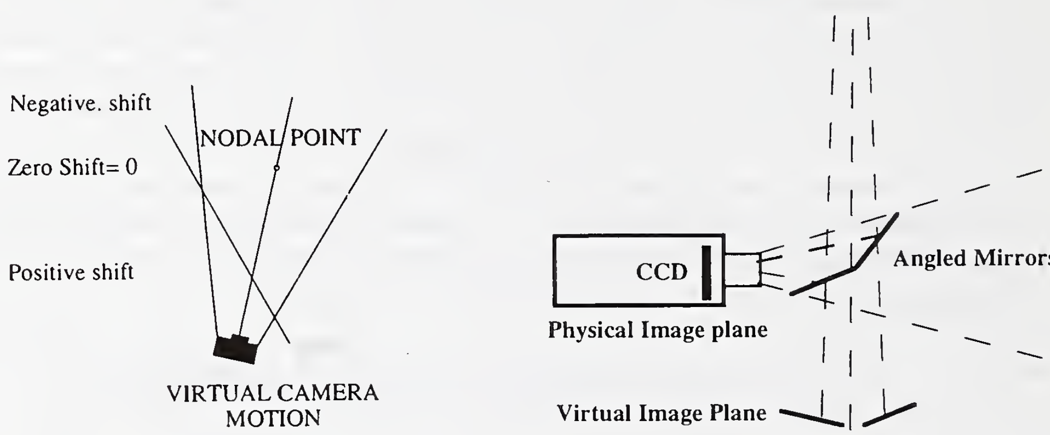

Figure 1: (left) Virtual camera motion. The optical axes are verged to improve depth resolution. (right) Virtual camera motion achieved using one camera and two angled mirrors. This setup is equivalent to the two camera model shown at left but requires only one camera.

3 Performance

The camera, which is fully described in[6], was positioned at distances between $40cm$ and $800cm$ from a textured surface. A Matrox PIP-1024 frame grabber was used to digitize

the images to 512 $\times$ 512 $\times$ 8 resolution. Two views of the scene are captured for each frame of video. As seen from fig 2 the distances detected by this device are in very good agreement with the actual distances. In a cluttered scene, containing objects at various distances, a simple threshold operation can be used to single out the closest and by definition, most important objects. Their location is then displayed to the user via audio or tactile stimulation.

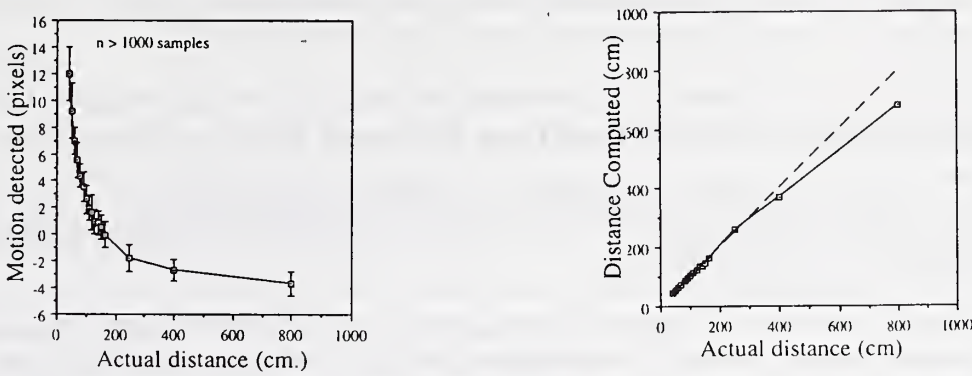

Figure 2: (a) Mean image motion, with standard deviation bars, computed for surfaces at various distances ($40cm$ and $800cm$) from the camera. The average and standard deviation of the computed image motion is shown for each distance. (b) Distances computed (solid line with rectangle) from mean shifts shown at left. These are in very close agreement with the actual distances (dashed line).

4 Conclusions

CCD images are processed in real time to provide simple depth maps of the environment. These are further condensed and presented to the user via stereo-audio or vibro-tactile stimulation. The scheme does not rely on any high level knowledge of the world. Therefore the processing involved is minimized and can be carried out in real time using presently available hardware. The high resolution images enable the detection of potential hazards in a wide field of view in front of the user and these can be selectively displayed via stereo-audio headphones or vibro-tactile stimulation.

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THE APPLICATION OF ARTIFICIAL NEURAL NETWORKS TO ELECTRONIC TRAVEL AIDS FOR THE VISION IMPAIRED

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Introduction

The study of *Artificial Neural Networks* is a field of *artificial intelligence* (AI) research within computer science that has received renewed interest over the past decade. This fresh interest is due to the difficulty experienced by classical AI in learning new concepts, relationships, etc. The field of AI concerned with learning is called *machine learning*, and it is in this field that artificial neural networks are being viewed as an alternative paradigm to complement the current symbolic view of learning and knowledge. The first, and to date, the only, electronic travel aid for the vision impaired to use the techniques of AI was the Sonic Pathfinder designed by one of the authors, Heyes. This device makes use of symbolic or classical AI to extract the information most relevant to the needs of the vision impaired pedestrian from the mass of information collected by the ultra-sonic front end. The purpose of the current investigation is to discover the value, if any, of incorporating artificial neural networks into the design of electronic travel aids. This paper records the first tentative steps.

Neurological research has shown that our knowledge is stored, not so much in our brain cells (neurones), but in the connections that exist between them; in particular the synaptic junctions found between an axon of one neurone and the dendrites of other neurones. As nerve impulses reach the neurone they accumulate; when a critical level is reached the neurone will fire. The interval between the successive firing of a particular neurone is determined by the number and the conductivity of the synaptic junctions feeding the neurone. As we learn, the knowledge and experiences we accumulate is reflected as an increase in both the number and the conductivity of these synaptic junctions. Artificial neural networks are essentially a simplified mathematical model of this, where synaptic junctions are represented as connections, each having numerical weights, which can be modified as the artificial neural network 'learns'.

We learn from the tuition of others and through our own experience. Similarly we may train artificial neural networks using two distinct learning techniques. Artificial neural networks may *learn* either by *supervised training* analogous to tuition by others; or by *un-supervised training,* akin to personal experience. Research into artificial neural networks has revealed that they display many of the psychological characteristics and learning patterns seen in humans beings. Unfortunately, like humans, artificial neural networks exhibit poor computational ability. Thus it is proposed that artificial neural networks be used to

complement classical AI techniques rather than as an alternative. Considerable research effort is being put into an examination of the means by which the two paradigms can be used together to best utilise the advantages of each.

Overview of the Investigation

This paper summarises the investigation undertaken for the minor thesis component of a one year *Graduate Diploma in Advanced Computer Science* at La Trobe University. The aim was to train an artificial neural network using *training data* obtained using an electronic environment sensor. Thereby to examine the *knowledge* acquired by the neural network as a result of training, and to compare decisions based on this knowledge with those made by a sighted pedestrian, and also to those made by the algorithm set currently used in the Sonic Pathfinder.

The artificial neural network used in this study used a *three-layered architecture* which was trained using the method of *back-propagation of errors.*

Data Collection and Training the Neural Network

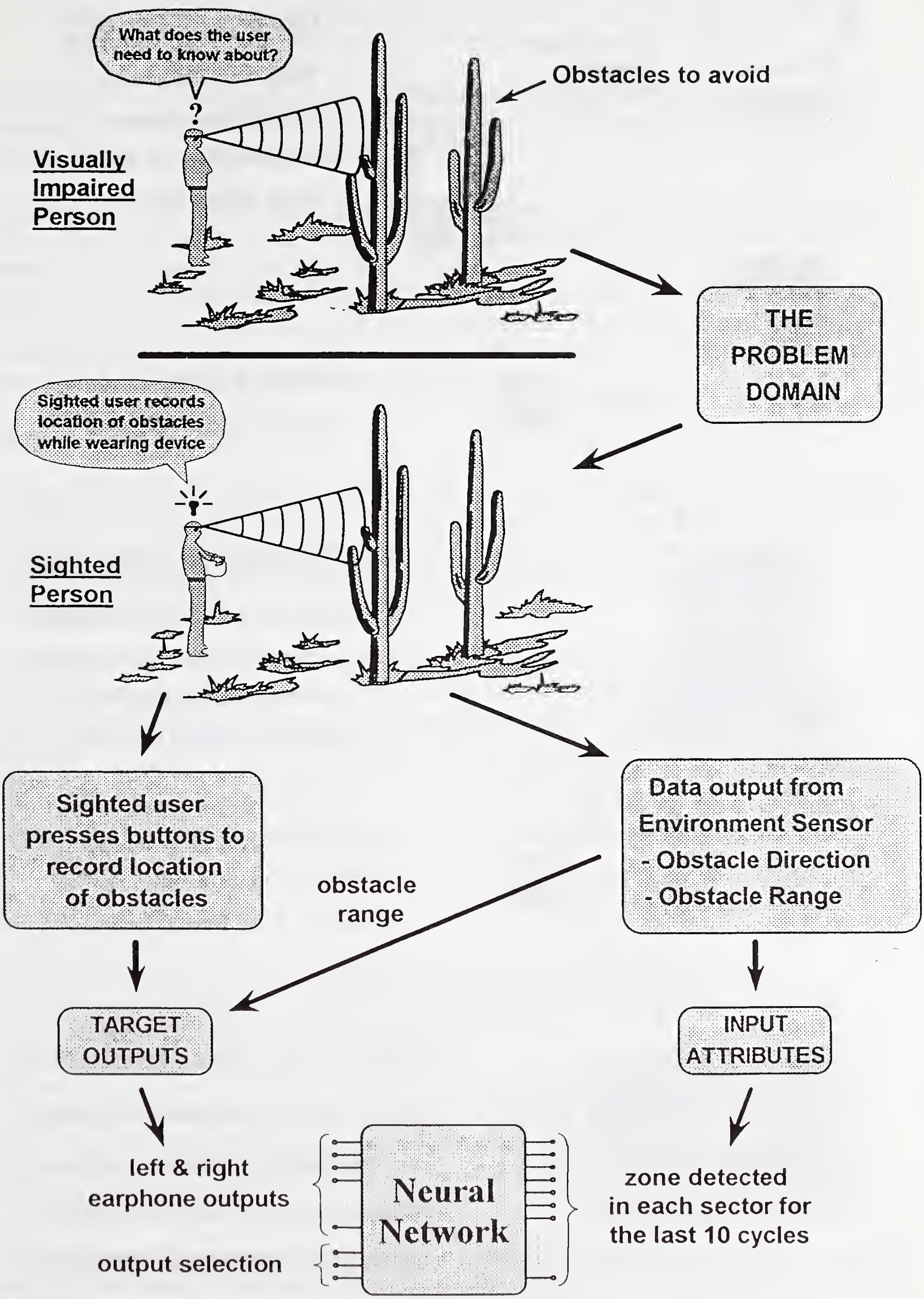
The diagram on the following page gives a pictorial view of the data collection process. A sighted experimenter wearing an ultra-sonic environment sensor moves through the environment. The experimenter does not receive any information from the sensor. The experimenter carries a keyboard on which he inputs data about the position of any obstacle about which he believes he needs to know. Data is collected on a laptop computer either carried in a back-pack or by an assistant. The data subsequently forms the *training set* for the artificial neural network; it comprises: (a) the *input data pattern* obtained from the un-processed data collected by the environment sensor, and (b) the *target data pattern* recorded from the keyboard. The sighted experimenter walked through a variety of environments so that a number of different mobility situations were recorded in the final data set. A cursory examination of the data suggests that we had 3000 discrete mobility examples in the training set.

The following three environments were traversed:

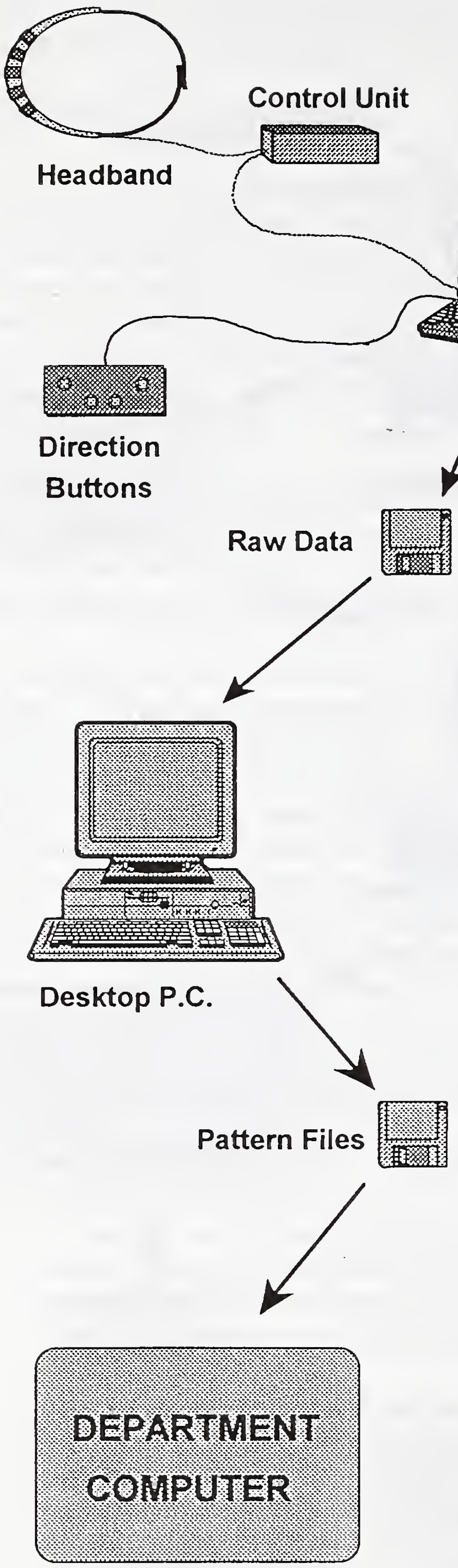
- Travelling alongside a continuous and flat concrete wall, where the sighted experimenter performs a set of head movements and pressed/released the buttons to correspond with the orientation of the head mounted environment sensor to the wall.

- Travelling through quiet residential streets where random but fairly passive obstacles are encountered such as: trees, posts, fences, overhangs, driveway openings and cars. This required subjective decisions to be made by the experimenter about which obstacles should be displayed.

- Travelling through a narrow walkway and along a footpath in a busy shopping district where more diverse and dynamic obstacles were



Collection of Data and Training The Neural Network



<u>Data Collection Stage</u>

Data from Pathfinder and buttons pressed are recorded on disk using laptop computer

Raw data is transferred to a P.C. for processing

<u>Data Editing and Conversion Stage</u>

Data files are viewed and garbage data is removed. Data is converted into pattern files suitable for training the neural network

Pattern files are downloaded onto department's computer for training of the Neural Network

<u>Pattern file processing & Training Stage</u>

Pattern files are merged and sorted to remove duplicate patterns and then random subsets of the final pattern file are used to train the Neural Network

Data Collection, Processing and Training

encountered such as: other pedestrians, shop displays, shop openings, overhanging signs and random footpath furniture. Again, the sighted experimenter made subjective decisions about which obstacles were important and therefore warranted display.

Having collected the training set, the data was transferred to the departmental computer at LaTrobe University and the artificial neural networks trained using the technique of *back-propagation*.

During back-propagation each of the time dependent input patterns were applied to the neural network. The neural network produced *output patterns*. The supervising computer compared the output patterns to the desired target patterns and, if there was a mismatch, adjusted the neural network. This whole process was iterative. It was left to run repeatedly through the training set - in our case 3000 examples - until the mismatch between the output data and the target data fell below a predetermined criterion.

Examining the results

Having trained an artificial neural network we are in a position to do two things: (a) build an actual device which incorporates a neural network into which is 'frozen' the knowledge derived from the *training*, or (b) examine the sub-symbolic knowledge encapsulated in the weights of the neural network by transforming them into a symbolic form.

A start has been made on the extraction of symbolic information from the network weights using a software package named BRAINNE developed by Dr Sabrina Sestito as part of her Ph.D. thesis undertaken at La Trobe University. BRAINNE is an acronym for **B**uilding **R**epresentations for **A**rtificial **I**ntelligence using **N**eural **NE**tworks. It is a tool for *automated knowledge acquisition*, the core issue of current research in *machine learning*. BRAINNE uses an iterative technique and gradually builds rules from the knowledge stored in the neural network.

Conclusions

At the time of writing a full analysis of the output from BRAINNE is not available, but the results analysed so far indicate a good correspondence with the strategies employed by the sighted user.

The essential symbolic rules, both static and temporally dependent, built into the Sonic Pathfinder have been *rediscovered* by the neural network. This might be because the inventor of the Sonic Pathfinder was used as the sighted experimenter in the data gathering part of the experiment!! We will not make this mistake again.

The results so far are very encouraging. It remains to be seen whether a neural network will design a better electronic travel aid than the Sonic Pathfinder.

SIMULATED RETINITIS PIGMENTOSA: THE EFFECTS OF DEGRADED VISION ON ORIENTATION AND MOBILITY

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Orientation and mobility instructors have two difficulties in assisting clients with Retinitis Pigmentosa (RP). First, instructors have difficulty encouraging clients to accept early training for what is a progressive vision disorder. People with RP are generally reluctant to accept any mobility assistance until they have severe visual field loss (Irwin T and De Bruin J, 1993; personal communication). Often they are able to circumvent their mobility difficulties by adjusting their lifestyle, and do so in preference to seeking mobility assistance. For example, they often restrict activities to daylight hours because of mobility problems at night. Second, mobility training of clients with RP who have, or are preparing for impaired night vision, often presents practical problems for instructors because training at night is unsafe and expensive.

The development of an appropriate simulation would enable orientation and mobility instructors to overcome these difficulties in training clients with RP. The simulation of advanced RP - combined severe visual field loss and night vision loss - and its effect on mobility performance was therefore investigated. An additional purpose of this investigation was to use a controlled, simulated vision disorder to compare mobility performance with visual performance measures.

METHODS

Twenty subjects were used for the experiment: 13 females and 7 males aged between 21-52 years. All of the subjects were physically fit and had no diagnosed ocular pathology. The task was to walk a route with a constant visual field restriction simulating advanced RP, under various levels of retinal illuminance. The mobility route was a quiet residential street of moderate difficulty. The route covered 220m of a straight, low contrast bitumen pathway, bordered by a grass verge and continual fences. Eight simulators were constructed using Dolphin Eyeline swimming goggles, the inside of which were painted to achieve minimal to no light leakage. The visual field was restricted to approximately 5 degree radius (measured using an Amsler Grid), by drilling a 0.5mm diameter hole into each pair of goggles. Retinal illuminance was varied by placing different pieces of Kodak Wratten No. 96 Neutral Density (ND) filters immediately behind the pinhole. The eight simulators, all with a pinhole, were constructed as follows: no filter and filters 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0.

The time taken for the subjects to walk the route without any simulation was measured twice, at the beginning and at the end of the experimental session. The average time was calculated. This was used to calculate Percentage of Preferred Walking Speed (PPWS).[1-3] PPWS is an objective index of mobility performance. It is the ratio, expressed as a percentage, of the vision impaired person's walking speed, to their preferred walking speed if low vision were not an impediment to mobility. As the route length remained constant, PPWS was calculated from a ratio of times, rather than calculating speeds.

The experimenter led subjects, using the sighted guide technique, to the commencement of the route. Subjects were asked to attempt to walk the route, provided they considered it safe. Trials were terminated if the subject became disoriented and needed the help of the experimenter to find their way back on to the path, or if they were at risk of physical injury. The following vision tests were administered outdoors at the end of each walk: Visual Acuity LogMAR Chart[4] , Low Contrast (10%) LogMAR Chart[5] and Melbourne Edge Test[6]. In order to maintain dark adaptation, the subjects were instructed to close their eyes whilst removing a simulator and replacing it with the next one. The procedure was repeated for each simulator in a random order.

To compare outdoor and indoor vision measurements, 10 subjects repeated the vision measurements for each simulator indoors. A second experiment was also conducted to test a suspected anomaly in the results. The Panel D15 colour vision test was added to the battery of clinical vision tests performed for each of the simulators.

Lighting measurements were recorded using the Hagner photometer for each subject. Lighting measurements did not vary significantly over the time taken for the subjects to complete the experiment, which was approximately 1½ hours. Illuminance varied by less than 1 log unit from day to day. Measuring task luminance facilitated the calculation of retinal illuminance (pupil area x luminance). Retinal illuminance is the important measure because we used a small artificial pupil size.

RESULTS AND DISCUSSION

A one-way analysis of variance showed that there was a significant effect of retinal illuminance on PPWS (Fig. 1). PPWS remained relatively constant in the photopic range of retinal illuminance, with small variation between subjects. PPWS then decreased with decreasing retinal illuminance in the mesopic range, with an increase in between-subject variation. Finally, a mean PPWS of 61% was reached for the darkest simulation in the scotopic range, for the 9 subjects who were able to walk under this condition.

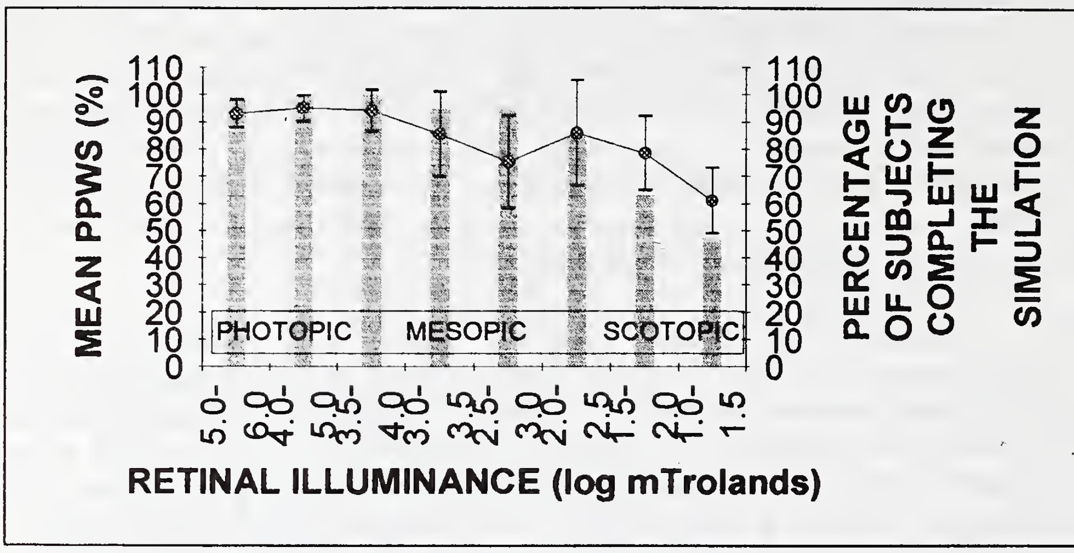

Figure 1. Mean PPWS as a function of retinal illuminance, with the error bars indicating ±1 standard deviation. The intervals of retinal illuminance represent a range approximately produced by each of the ND filters used for the simulations, and account for the variation in luminance on different days. The underlying bar graph represents the percentage of subjects who completed each simulation. The assumed photopic range is above 4.6 log mTrolands, the mesopic range between 2.1-4.6 log mTrolands and the scotopic range below 2.1 log mTrolands.[7]

The decline in PPWS was not smooth. There was an inflection in the curve between 2.5-3.0 log mTrolands. At this point, PPWS dropped to 75%, slightly recovered, and then steadily declined again. The critical simulators were inspected under a microscope and not found to be defective. A new simulator incorporating the 2.5 ND filter was constructed for a second experiment which yielded the same results. The level of retinal illuminance at which the inflection occurred approximates the transition from mesopic to scotopic conditions. The Panel D15 colour vision test used in the second experiment substantiated the hypothesis that the inflection corresponded to the transition from cone vision to rod vision, for a small pupil entrance.

There was a significant and similar effect of retinal illuminance on outdoor measurements of mean visual acuity and mean Melbourne Edge Test (MET). With decreasing retinal illuminance there was a decrease in visual acuity and MET, with a substantial degree of between-subject variation. Again, there was a point of inflection on the curve between 2.5-3.0 log mTrolands. The inflection corresponded to a mean visual acuity of 6/60 and mean MET score of 9dB.

For visual acuity better than 6/19 and MET score better than 11dB, PPWS was 80-100%. This finding supports anecdotal clinical evidence that people with RP who have severe visual field restriction and good visual acuity maintain adequate

mobility performance in certain conditions. Visual acuity and MET scores worse than 6/19 and 11dB did not predict PPWS, as indicated by the increase in scatter of the results. The relationship of PPWS to visual acuity ($r = -0.50$, $p \leq 0.05$) was similar to MET ($r = 0.55$, $p \leq 0.05$). However, edge contrast sensitivity was more useful because measurements were obtained on more subjects in scotopic conditions.

Even at high levels of illuminance there was a large between-subject variation for low contrast (10%) visual acuity. Only two subjects were able to complete the trial at 3.0-3.5 log mTrolands, and no measurements were possible below this level. When it was possible to measure low contrast visual acuity, it was a poor predictor of PPWS.

Visual acuity, low contrast letter acuity and edge contrast sensitivity were not measurable indoors, when looking through a 0.5mm pinhole in conjunction with a 2.0 ND filter, or darker. This is because the difference in indoor and outdoor illuminance was almost 2 log units. The difference was critical in our simulated vision loss and it is likely to be so with any real vision impairment. Indeed, the indoor and outdoor visual performance of people with vision impairment can vary greatly.[8] Indoor vision performance and outdoor mobility performance would therefore be difficult to correlate because of the significant difference in indoor and outdoor illuminance. In order to have any predictive value, measurements of vision must be conducted under the same conditions as measurements of mobility. If we wish to understand the role of residual vision in outdoor mobility performance, our vision tests may be best utilised outdoors, unless we can replicate outdoor illuminance in the consulting room.

There was a large individual variation in the mobility performance of subjects under RP simulation. Brown et al[9] also found considerable individual variability in the mobility performance of people with Age-Related Macular Degeneration. Some people with vision impairment navigate their way around the environment adequately, whilst others similarly impaired do not. For the mesopic and scotopic conditions created by our simulation, some subjects were confident in attempting the mobility task, whilst others were fearful for their own safety and would not attempt the task. Thus, mobility performance was influenced by one's interpretation of danger, and not just by quantitative vision loss. Personality factors (such as risk acceptance) may have partially explained differences in mobility performance when measurable vision was the same. A personality questionnaire regarding these attitudes may have helped to predict the mobility performance of people with vision impairment.

CONCLUSIONS

No one measure fully explains the variance in the mobility performance of people with vision impairment. Marron and Bailey[10] suggested that residual vision, age of

onset of visual impairment, posture and balance, intelligence, body image or space orientation, auditory-tactile abilities, and personality factors contribute to the mobility performance of people with low vision. Not surprisingly, our results for a given simulation of RP reflected this and showed considerable individual variation. Also, the clinical measures of vision that we used explained the variance in mobility performance only partially, edge contrast sensitivity explaining 30% of the variance and visual acuity 25%.

A 2.5 ND filter with a 0.5mm entrance pupil diameter reduces PPWS to 75% and retinal illuminance to mesopic/scotopic ranges. Such a simulation is representative of the problems experienced by people with RP when travelling at night. To eliminate the cost and safety issues associated with training clients at night, a pair of goggles incorporating this filter and pinhole could be used to simulate night conditions during the day. Orientation and mobility instructors could also use this simulation to demonstrate to clients with early RP their prognosis and the mobility problems they will experience. Clients may then be encouraged by the value of orientation and mobility training and accept assistance at an early stage of the disease.

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VARIATIONS IN MOBILITY IN INDIVIDUALS WITH MODERATE LOSSES OF VISUAL SENSITIVITY

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This study concerned the relationship of variations in type and degree of visual impairment among individuals with moderate losses of visual sensitivity to their mobility in outdoor and indoor situations. Specifically, we evaluated the relationship of contrast sensitivity, central acuity, and peripheral visual field losses to behaviors such as obstacle negotiation abilities while walking in an unfamiliar area and the ability to remain on a travel path.

We hypothesized that contrast sensitivity and visual field size would contribute more than acuity to variations in mobility performance. We believed that visual contrast sensitivity would be related to mobility performance because many objects encountered during travel have relatively low contrast with their surroundings, thus making them difficult to detect visually. Visual field measures also are likely to be related to mobility performance because the ability to detect overhangs and small objects on the footpath is likely to be limited by visual field loss. Thus it seems reasonable to hypothesize that behaviors such as object contacts would increase with declining peripheral visual acuity.

This study involved two sets of procedures. One set was used to assess the participant's vision and another to assess mobility. Twenty two persons with low vision who traveled independently outside their home on a regular basis participated in the study. Participants ranged in age from 19 to 58 years, with a mean age of 36.1 years (S.D. 11.1 years). Fourteen of the twenty-two participants were congenitally blind. Participants had no obvious or reported disabling conditions other than visual impairment, and all reported some independent outdoor travel at least occasionally during daylight hours. Eighteen of the participants had undergone at least some mobility instruction prior to the time of the study, but none were involved in instruction while the study was being conducted. Eight were regular cane users and used their cane during the course of this experiment. There were eleven causes of vision loss reported by the 22 participants, including glaucoma, congenital cataracts, albinism, retinitis pigmentosa, optic atrophy, and macular degeneration.

Participants were asked to walk three routes. The routes were in a classroom building (0.25 mile length), a residential area (0.33 mile length), and a small business area (0.30 mile length). Order of the routes was randomized. None of the participants were familiar with the routes walked. To score the walks, categories of behavioral incidents (e.g., stops, object contacts, off-path) were established. Videotapes of all walks were viewed by one of three pairs of scorers. Reliability of scoring was established. Each participant also was tested for acuity, visual field and contrast sensitivity. The three vision measures were administered in randomly determined orders. Contrast sensitivity was assessed using microcomputer-generated grating patterns which were displayed on a black and white television monitor. Sensitivity was assessed binocularly at a

maximum of 11 spatial frequencies using two test distances (57 cm and 228 cm).

Participants were tested binocularly for visual field impairment using a translucent plexiglas hemisphere which served as a bowl perimeter. Field measures were obtained in all directions from a central fixation point. The visual field test procedure assessed both central and peripheral field losses.

Visual acuity was assessed binocularly using the Feinbloom Distance Test Chart for the Partially Sighted.

As expected, contrast sensitivity, visual field, and visual acuity were all substantially lower than normal for the low vision participants. In particular, participants' overall sensitivity to contrast and their sensitivity at peak spatial frequency was sharply attenuated when compared to sighted persons. Only one participant could detect the stimulus at 15.2 c/d, even with maximum contrast. Most participants failed to detect the presence of bars with a spatial frequency of 3.71 or higher. At .25 c/d, the lowest spatial frequency tested, low vision participants were approximately ten times less sensitive than the group of six normally sighted individuals tested. The mean number of behavioral mobility incidents summed across the six walks was 15.27 (S.D.= 12.6). The best mobility performance was one, while the worst was fifty.

Visual acuity and sensitivity at peak were converted to log data for all correlational analyses. Contrast sensitivity was found to be significantly correlated to mobility ($r = .37$, $p = .05$), whereas visual acuity was not (.07). Visual field also was significantly correlated with mobility ($r = -.38$, $p = .05$). Multiple regression analysis was conducted using the three vision measures as

predictor variables and the mobility measure as the criterion variable. The regression analysis reveals that 39% of the variance in mobility is accounted for by contrast sensitivity and visual field, while the addition of visual acuity explains only four percent additional variance. The standardized beta weights for the regression equation revealed that contrast sensitivity and visual field accounted for roughly equal amounts of variance in the regression.

Losses of contrast sensitivity at relatively low spatial frequencies, which are believed to contain most of the information relevant to detection of edges and borders, may be particularly relevant to mobility. It is interesting to note that the correlation of mobility with contrast sensitivity data obtained at .67 cycles per degree of visual angle was greater than the correlation at the lowest spatial frequency tested (.25 cycles per degree) or at any other spatial frequency. This finding suggests that there may be specific spatial frequencies that have particular relevance for visual guidance of mobility.

A logical extension of the work would be to find out if training time or progress through training differs between individuals with differing patterns of field loss or sensitivity to contrast. Other studies of interest include observation of various groups of travelers with etiologies which are likely to produce particular deficiencies in visual field or sensitivity to contrast, or evaluation of sighted persons' mobility while they negotiate situations with various components of spatial frequency or visual field information eliminated or artificially occluded. Investigation of parafoveal contrast sensitivity and mobility may also be useful, as this measure of contrast sensitivity combines into one psychophysical procedure the testing of contrast sensitivity and visual field.

THE EFFECT OF REDUCED ACUITY ON THE ABILITY TO SEE ROAD SIGNS

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John Callegari BAppSc(Orth)

ABSTRACT

The Roads & Traffic Authority of NSW requires a corrected eyesight standard of 6/12 with one or both eyes together for all classes of licence.This paper looks at the ability of people with normal acuity and then artificially reduced acuity to identify road traffic signs. It was found that as the acuity was reduced the distance at which the sign is seen is also reduced. When the reaction time was related to travelling at 60 km/h it was shown that, for letters the same size as a Stop Sign, a person with 6/6 acuity had 6 seconds to react and when the acuity was reduced to 6/18 they had 1 second to react. Results are reported for letter sizes equivelent to stop signs, street names and traffic signs.

Key Words: road signs, reduced acuity

INTRODUCTION

Nearly every decision or action made whilst driving is based on what a person sees. If visual processing is defective, then information processing will be defective. A visual acuity standard is required by the Drivers Licencing authorities across Australia. In NSW it is "6/12 with either or both eyes together for issue of all classes of licence". (RTA 1993)

Because there is a statutry minimum requirement for visual acuity it is assumed that there is a relationship between visual acuity and road safety, otherwise why would there be any such minimum requirement? (Daile 1976) An even higher standard of vision for a licence to drive a public passenger vehicle also implies that a better standard of vision provides a greater measure of safety for drivers. It is interesting to note that in a survey of Brisbane drivers, McConnell (1991) found that of the 503 participants 6% had visual acuity of less than 6/12 and 8% failed to meet the acuity requirements for a drivers licence in Queensland. In spite of licence standard there are many people driving with less than the standard.

Some researchers have considered the issue of visual acuity and its relationship to driving. For instance Hofstetter (1976) stated that the role of central visual acuity at distance is undoubtedly most significant in terms of distinguishing road and street signs. He claims that most signs in the USA are designed to be legible at about 80 metres when a person has 6/6 acuity. He reasoned that this corresponded to a maximum reaction time interval of three seconds for a driver travelling at 100 km/h. Therefore for a person with 6/12 the same sign would be seen at 40 metres and the maximum reaction time would be 1.5 seconds. Only by slowing down to 50 km/h would the person with 6/12 acuity gain the same three seconds of reaction time. This theory has not been tested.

Burg reasoned that as the major portion of a drivers' visual task involves perception of objects that are moving relative to himself then dynamic visual acuity (DVA- the ability to resolve the detail of a moving target) should be tested in the driver licencing examination. Currently the Snellens method is used which is static. Burg developed a DVA tester and from his results concluded that "DVA is the most consistent vision test in showing a significant relationship with driving record; static acuity and visual fields are next in importance" In this instance the driving record referred to accident rate. However, accident free driving does not necessarily mean safe driving and this has not been taken into account.

In the area of defective vision and visual function in the drivng situation, Fonda (1989) found that when eight people who had 6/60 visual acuity and a field greater than 120 degrees drove at 40 mph in daylight conditions, they were able to recognise traffic symbols and stop safely.

The effect of reduced vision on the ability to see adequately in the driving situation is unproven. It is difficult to test because of the many variables involved such as the inconsistancy of the driving environment and the wide variety of visual pathology that occurs which can have a complex effect on visual appreciation.There is also the

need to test dynamic visual function, and to consider the safety of drivers in any on-road research situation. There is a need to develop procedures that take these issues into account.

The purpose of this research was to investigate the effect that reduced visual acuity has on the appreciation of road signs. Because of the complexity of the visual issues it has been designed using people with normal visual acuity; filters to produce three levels of reduced acuity; road traffic signs which are consistent in presentation; and an off-road test procedure which is dynamic and controlled for environmental interaction.

SUBJECTS

Twenty volunteers between the ages of 18 and 23 years were selected. They meet the criteria of being emmetropic, had 6/6 visual acuity in each eye and held a current drivers licence.

MATERIALS

Filters - Three levels of Bangerter Graded Occlusion Patches were placed each on a pair of plano lenses fixed within a spectacle frame. The filters selected were 0.6 , 0.3, and <0.1. The 0.3 filter was chosen as it reduced the acuity to the level of 6/18 at which a licence would be cancelled. The 0.6 filter was selected to determine the effect of a minimal filter and the <0.1 was selected to examine the effect of grossly reduced vision.

Road Signs - Three signs were developed. Each was black print on a white background. The word presentation and letter measurements matched the size used by the Roads and Traffic Authorities in NSW. The black and white presentation was selected to avoid the complication of colour appreciation, variability of contrast and to maintain consistency with the Snellens acuity procedure. The material used for the signs was also non reflective. The signs and the internal letter size were were STOP (letter size 20 by 2.5 cms), ELM ST (9 by 1.8 cms) and KEEP LEFT (8 by 1cm). On the 6m Snellens chart a 6/60 letter measures 8.7 by 1.7 cms and a 6/36 letter measures 5.2 by 1.0 cms.

PROCEDURE

Clinical Procedure
Each subject had their vision tested on the Snellens acuity chart with both eyes open and plano glasses, then with each of the filters in the sequence of 0.6, 0.3, and <0.1.

Non Clinical Procedure
Each subject was tested outside in an environment that was full sun and within the hours of 11am to 1pm thereby ensuring consistent lighting. They were taken 170 metres from the position where the signs would be presented and stood so that they had a straight view of the signs. When each sign was presented the subject walked towards the sign until they could read it. This distance was recorded. The procedure was carried out using plano glasses and no filters, then using the filter strengths 0.3, 0.6, and <0.1.

In order to determine the confidence of the subjects to drive with vision reduced to the level at or just below that required by licencing authorities in NSW, each subject was asked if they would, discontinue driving, restrict driving hours and distances, or continue driving as normal if the vision achieved with the 0.3 filter was their best achievable vision.

RESULTS

The Effect Of Filters On Snellens Acuity
The effect is shown on graph 1. The stronger the filter the greater the effect on vision and the broader the range of effect on the acuity. For instance through the 0.6 filter most people had 6/9 acuity. With the <0.1 filter there was a range of responses between 5/60 and 2/60.

The Effect of Reduced Acuity on the Sign Appreciation
Table 1 and graph 2 shows the averaged distances at which each sign was first read through each of the graded filters. The larger letters of the stop sign were seen earlier than the smaller letters of the other signs. As the filter strength increased the distance at which the sign was appreciated decreased. The difference in the distances averaged across the visual acuity achieved for each filter is highly significant ($p < 0.0005$).

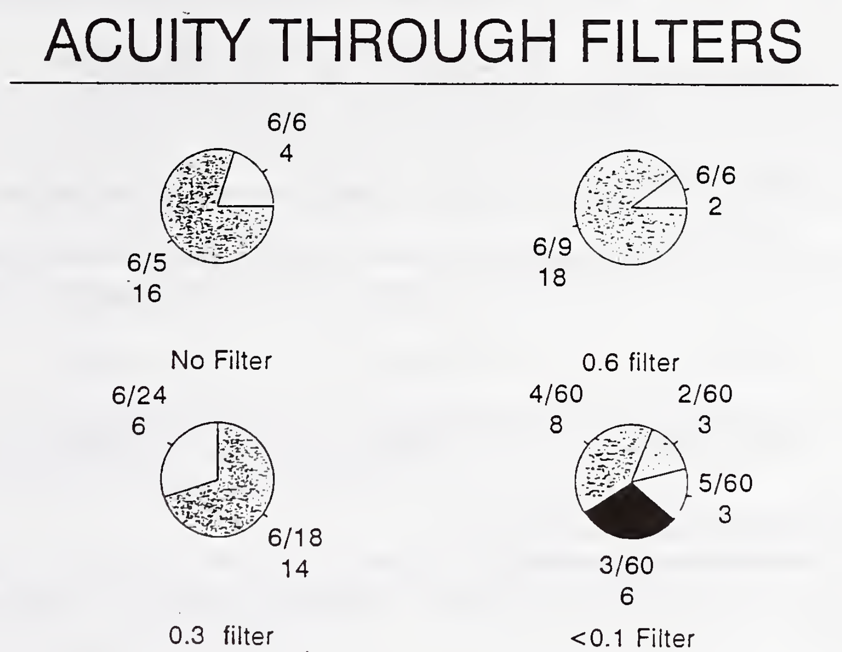
Reaction time

The relationship between the appreciation of the traffic signs and the amount of time taken to stop was calculated by doing a repeated measures analysis of variance using the MANOVA model. The average distance at which the traffic signs became recognisable was calculated for the subjects' response when using their best acuity (6/5 or 6/6). When the car was travelling at 60km/h the time between recognition of the sign and reaction was 16.7m/second.

Using this information the reaction time can be calculated using the following formula.

$$\text{Reaction time} = \frac{\text{average distance sign observed}}{16.7}$$

GRAPH 1



GRAPH 2

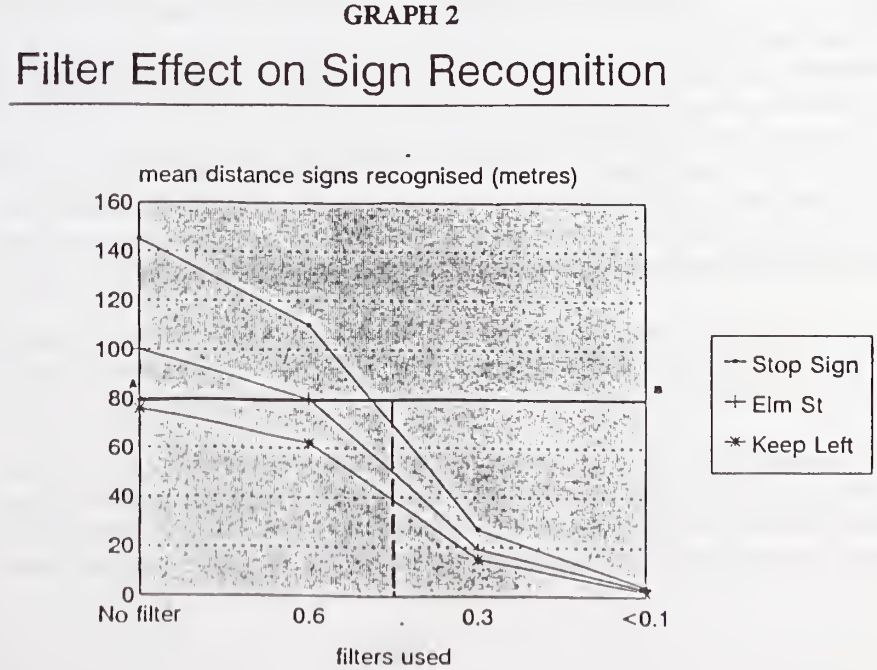


Table 1 Effect of filters on the distance at which signs are seen
(Average distances in metres at which signs are seen)

SIGNS/ FILTERS	STOP SIGN	ELM ST SIGN	KEEP LEFT SIGN
No Filter	145.14 m	100.50 m	76.2o m
0.6 Filter	110.10 m	79.75 m	61.50 m
0.3 Filter	26.80 m	18.85 m	14.90 m
<0.1 Filter	4.25 m	2.60 m	1.85 m

Table 2 shows the results of this calculation for subjects using no filters (average acuity 6/5) compared with subjects using the 0.3 filters (average acuity 6/18). It can be seen that subjects with no filters, when travelling at 6o km/h., have 8.7 seconds between the time the stop sign was recognised and then passed. This is sufficient time to slow down and stop. Viewing the same stop sign a person looking through a 0.3 filter who has 6/18 - 6/24 vision has only 1.6 seconds reaction time. A similar reduction in the calculated time can be seen for the other signs.

Table 2 REACTION TIME

FILTERS /SIGN	NO FILTER	0.3 FILTER
STOP	8.7 secs	1.6 secs
ELM ST	6.0 secs	1.1 secs
KEEP LEFT	4.6 secs	0.9 secs

<u>Continuation of Driving with Reduced Vision</u>

In response to the question about continuing driving with an acuity level of 6/18 -6/24 , 4 subjects said that they would stop, 13 said that they would restrict their driving and 3 said that they would continue as normal.

DISCUSSION

The four filter levels used in this study gave four different acuities and responses to the road signs. In discussing the responses it must be reinforced that the signs had no colour to influence recognition of the content.

The first level, of no filter, allowed the participants to function in their usual capacity and with maximal acuity at the top level average of 6/5. If the USA standard quoted by Burg, that signs have been designed to be seen at 80 metres, is related to the response in this study then it can be seen from graph 2 (line AB) that the first two signs are seen well before 80 metres and the KEEP LEFT sign is seen just under. The difference in recognition relates to letter size. Using the USA standard in the formula to calculate reaction time a sign seen at 80m allows 5 seconds reaction time. As can be seen in table 3 the STOP sign is seen earlier than 6 seconds and 4 seconds ahead of the KEEP LEFT sign. The earlier recognition allows more time to execute the stop. The smaller letter size allows less reaction time but in this case the reaction required is to slow, so less time is required. These responses suggest that the letter size used in road signs is well selected for people with maximal acuity.

The first level of filter, 0.6, produced an average acuity of 6/9. This better than the minimal level required by the RTA in NSW of 6/12. When using this filter the STOP SIGN was recognised earlier than 80m but both of the other signs were seen later. This suggests some problems responding to the second two signs.

The 0.3 filter reduced the acuity to an average of 6/18 which is one level less than the NSW RTA requirement. Using this filter none of the signs were seen at or before 80m. In fact they were recognised well under the distance. Table 2 shows the calculated reaction time is very small. Burg and Hofstetter refer to the value of reducing speed in the presence of reduced acuity. The amount of speed reduction required to recognise signs in the presence of 6/18

acuity would be considerable and whilst satisfactory for the driver could produce major problems on the road for other drivers.

The final filter used <0.1 produced an average acuity of 4/60. The distance at which the signs were seen was well under 80m This suggests that acuity at this level makes actual letter recognition very difficult.

In this study there is a clear relationship between reduced acuity levels and reduced ability to recognise the words in road signs. The calculated reaction time shows a similar reduction.

The current acuity limit in the NSW RTA Medical Guidelines is 6/12. The filter power that is likely to produce this acuity is likely to be between 0.6 and 0.3. By using graph 2 and drawing in the distance at which the signs could be appreciated (dotted line) it can be hypothesised that the STOP sign would be seen at 70m which would allow 4 seconds reaction time, which is slightly under the considered safe reaction time. The remaining signs would be seen at 50 (3 seconds reaction time) and 40m (2.5m reaction time) respectively which is reduced. These findings support the level of 6/12 acuity as being the upper limit of acuity.

It thus acknowledged that this study has investigated limited aspects of vision as used in the driving situation. By using the population of 18-24 year olds the response of only one age group has been assessed. By altering the acuity level in the test population, the effect of the acuity reduction was isolated. It allowed personal feelings to be questioned about driving with reduced acuity and produced the response that the majority would alter their driving pattern. Whilst this is useful information it does not take into account gradual loss of acuity to which people adapt.

As with all aspects of driving the issue of visual function is complex and research needs to include other issues such as the effect of colour and light variation on sign recognition.

CONCLUSION

This research supports the current minimal level of visual acuity that is used by licencing authorities. Visual acuity at less than these levels either diminishes the ability to see the signs and react safely or requires the driver to travel at speeds that are considerably less than the recommended levels.

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SPECIAL INTEREST WORKSHOP

CHILDREN

CONFERENCE PROCESS/FORMAT SUGGESTIONS:

1. Longer sessions, practice with discussions.
2. Speakers bring resource list, address, cost.
3. Place in conference for "home" videos for sharing.
4. Integration/sharing of resources from other fields.
   Conference process/format suggestions.
5. List and display of resources, books, agencies, practical ideas, mailing list.
6. Alternative mobility devices "bring your favourite".

CONFERENCE CONTENT:

1. Uses of videotape - teaching, evaluation, communication.
2. Setting up, maintaining and running effective trans disciplinary inclusive teams.
3. Beliefs (about blindness/vision).
4. Orientation and Mobility assessment for all Vision Impaired children.
5. Orientation and Mobility with a) artistic
   b) behaviour children.
6. Orientation and Mobility activities indoors for children in wheelchairs.
7. Specifics on "precane" games - how.
8. Spatial concepts and development.
9. Value of tactile maps.
10. Vocabulary (language) and spatial concepts.

REPORT ON THURSDAY AFTERNOON SESSION.

General needs were expressed; to know more about Current Resources, Publications; to network and share information via an awareness of different Orientation and Mobility working with children; and a knowledge of their different experiences and areas of expertise.

A mailing list of those interested and willing to share their Time and Resources was developed. In addition a list of topics was developed in hopes of having a pre or post conference workshop in conjunction with the next IMC CONFERENCE IN NORWAY.

Some of the Topics of Interest:

Were also raised in greater detail in today Workshop.

* Orientation and Mobility wheelchair children with Intellectual disabilities - ie games.

The specifics from Thursday included.

* Orientation and Mobility for Pre - schoolers, infants.
* Program for Parents of Visually Impaired and Multi - Handicapped children.
* Sensory training.
* Low Vision Orientation and Mobility for children.
* Typical Mobility problems exhibited by children.
* Mobility and the multi - handicapped child.
* Involving parents in pre - school Orientation and Mobility.
* Orientation and Mobility.
* Spatial cognition in Orientation and Mobility.

Models for effective teamwork in assessing and training Orientation and Mobility for children with emphasis on:

* Team structure.
* Parent involvement.
* Reporting Techniques.
* Team facilitation.
* Evaluation.

Modified techniques for pre - school Orientation and Mobility. Necessary continuing education for Orientation and Mobility to children. Balance and Gait problems and the development of Orientation and Mobility skills.

In addition to this, the group discussed their various services relative to delivering Orientation and Mobility to children and generated a list of addresses with specific areas of expertise on Orientation children to be used for resource sharing.

It was also suggested that we continue correspondence and perhaps develop an International List citing the different programs currently running in different Institutions and Countries.

This Conference is serving as a springboard for coalition forming and hope to lead on to bigger and better International sharing of knowledge especially as concerns Orientation and Mobility children; an area near and dear to this group's heart.

Address Lists available from:

Jane Boyce
Orientation and Mobility Instructor
P.O. Box 2298
ORANGE NSW 2800
AUSTRALIA

SPECIAL INTEREST WORKSHOP

ORIENTATION AND MOBILITY RESEARCH

The discussion in this workshop fell into three principal areas: Research needs, Issues and Recommendations.

RESEARCH NEEDS

Research was seen to be necessary on the Impact of Orientation and Mobility tuition, that is on the wider and longer term outcomes as they relate to the consumer and significant others. A further point was that the recent apparent emphasis on Technological aspects may have been at the expense of Psychological considerations of Orientation and Mobility tuition and practice and that Psychological research should be encouraged. A third research need was thought to be that of investigation into the practice, the methodology and the strategies employed in Orientation and Mobility.

ISSUES

Three issues were considered important. Firstly, gaps were seen to exist in dialogue opportunities between consumers and Orientation and Mobility Instructors, with perhaps the need for some form of consumer representation. Secondly, it was thought to be important to focus on developing access to existing technology, as being possibly more productive than the development of special technology. Thirdly, gaps were held to exist in information availability about devices and financial resources to enable consumer access.

RECOMMENDATION

It was recommended that International Mobility Conference 8 have:

1. A specific session on Rural Mobility Devices and Techniques.

2. A session early in the program designed to stimulate communication between Consumers, Researches and Practitioners.

A recommendation was also made for the development of consumer "wish list" to help guide technological research in their endeavours.

J.K.Holdsworth
Chairman
3 February 1994

SPECIAL INTEREST WORKSHOP

VISUAL SCIENCE AND ORIENTATION AND MOBILITY WORKSHOP

The working group felt that there is a pressing need for Orientation and Mobility to forge a closer working relationship with the visual science community. Such an alliance can be expected to further the goals of the Orientation and Mobility profession, improve the clinical value of visual science research and qualitatively improve services to individuals who are blind or visually impaired.

Specifically, the following issues require consideration and affirmative action:

1. **Measurement Issues:**

   a. There is a need to establish baseline measurements to define "normal" mobility and define what measurements are needed for mobility.

   b. The effect of such interacting factors as aging, the presence of other disabilities needs to the elucidated.

   c. There is a need to develop objective, subjective, and ecologically valid measures to define and conceptualise mobility.

   d. Further research is warranted on such special mobility situations as driving.

   e. And, it is recognised that the issue of adequate measurements in mobility will require the development of valid outcome measures and the employment of long-term, multisite research methodologies.

2. **Low and High Technology Issues:**

   Progress in applying technology to Orientation and Mobility will be facilitated, by a better understanding of the following:

   a. What information should be gathered for the Instructor?

   b. How much information should be given to the traveller?

   c. Why is the information given?

   It was also recognised, in regard to technology that attention should also be paid to:

   d. Environmental modifications and

e. The impact of technology, including medical technology on the client's self identification.

It also must be made explicit that we believe that technological progress cannot be achieved without meaningful consumer input.

3. **Professional Development:**

Research, no matter of how great a value, must be put into clinical practice to be effective. It is therefore incumbent upon University faculty to aid researchers in determine what information is needed by the profession. Similarly, it is incumbent upon researchers to involve practitioners in their research to ensure that results can be effectively disseminated.

4. **Perceptual/Cognitive/Psychological Issues:**

Orientation and Mobility instruction is not provided as an isolated intervention with the client. We therefore feel that perceptual, cognitive and psychological factors must be explored. Among the questions needing answers are the following:

a. What defines the goals of mobility, or what defines "success" and "failure"?

b. What is the effect of an adventitious or a congenital, vision loss on mobility?

c. What factors influence client acceptance or rejection of mobility aids?

d. How do people initiate and/or control their mobility behaviours?

e. How much, and what type, of information does the client feel he/she needs for mobility? Could an information check list be developed?

f. What are the client's needs and wants regarding mobility and can these be prioritised?

5. **Orientation and Mobility, Consumer, and Visual Science Issues:**

a. Funding for research, and the increasing difficulty in obtaining it has become a major impediment to progress. We therefore suggest that blindness agencies allocate a portion of their income to support research. We further request that they become active lobbyists with local and federal agencies to increase the priority of research on visual impairment and blindness.

b. We recognise that there are other possible impediments to progress. There are language differences between the Orientation and Mobility and Visual Science communities and a Rosetta Stone and translators will be needed. Additionally, it may be difficult to find common or at a minimum, compatible goals. Still the benefit of this alliance will surely outweigh the difficulties.

c. We will need to develop new communication channels and we ask that the international organisations support us in this effort. We request that International Mobility Committee, World Blind Union, Association for Education and Rehabilitation of the Blind and Visually Impaired, Orientation and Mobility Instructors Association of Australasia and Low Vision Research Group set aside time and space in their meetings and publications to promote research co-operating between the Orientation and Mobility and the Visual Science professions.

The value and need for such support is clear, and perhaps the greatest testimony of this is shown by the overlapping concerns expressed by this workshop with the workgroups on research and on the elderly.

Thank you for your attention to these important concerns.

Recommendations:

This topic be addressed at IMC-8, Norway in 1996.

IMC	-	International Mobility Committee
WBU	-	World Blind Union
AER	-	Association for Education and Rehabilitation of the Blind and Visually Impaired.
OMIAA	-	Orientation and Mobility Instructors Association of Australasia
LVRG	-	Low Vision Research Group

CROSS-SECTIONAL DEVELOPMENT OF LONG CANE SKILL AT STANDING POSITION

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For many of the blind, the safety and orientation necessary to self-reliant travel depends on skillful use of the cane. The touch technique is the method for walking with a cane conventionally chosen by specialists teaching orientation and mobility to the blind. The touch technique provides information and protection by enabling the traveler to check thoroughly the area a full stride ahead, locate drop-offs and most objects in a path two inches wider than one's body width, and level changes to one inch above ground level (Hill and Ponder, 1976). It is considered that the touch technique is one of long cane skills as well as the constant contact cane technique. The purpose of this study was to examine cross-sectionally the development of the touch technique during a static position.

Methods

Twenty seven blind persons, 17 males and 10 females, aged from 6.9 to 38.2 years, took part in the experiment. In a standing posture, each subject was asked to operate the cane in touch technique 100 times. The movements of the marker tapes were filmed for acquiring the data of the time and range of a swing of the cane, distance between the cane tip and the floor, and the position of the wrist. Video camera was placed 5 m from the line of experiment on the frontal side on the floor. The first 10 right-and-left movements of the cane tip and the wrist were recorded by video camera and were analyzed with a computer. Fig. 1 typically shows trajectories of movements of the cane tip and the wrist.

Results and Discussion

For children using the long cane for the first time, time of a swing was about 2 to 2.4 seconds showing wide dispersion. The older persons showed more consistency with time approximately 1.2 seconds.

Fig. 2 shows the developmental changes in trajectories of movements of the cane tip and the wrist. Range of swing to left and right of the wrist showed that swing to the left did not present difference between those of different ages, while the swing to the right became bigger with age making it closer to symmetrical movements. Distance of the tip of the cane from the floor for younger children recorded more than 10 cm with bigger standard deviation. On the other hand the older they were, the more stable it was and closer to the ideal 3 cm. Position of the wrist of children aged 6 to 7 was a great deal of to the right of the median line with bigger movements. With advancing age, however, wrist moved less and stayed closer to the median line.

From these results, it is concluded that the time and range of a swing of the cane, height of the tip of the cane from the floor, and the position of the wrist became more accurate in older persons approaching the ideal skill of cane use. This may be attributed to the fact that the wrist acquires fine motor skill in using cane as they grow older. This may provide a hint in deciding the appropriate timing to start training blind children in their use of the cane.

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Table 1. Subjects

(Mean±1SD)

Gender	Age (years)	Height (cm)	Weight (kg)	Visual Acuity R	Visual Acuity L	Length of the cane (cm)	n
M	13.7±7.0	146.7±19.0	44.7±18.1	0-0.02	0-0.03	109.1±15.9	n=17
F	12.5±7.3	135.7±14.5	33.3±8.2	0-m.m.	0-m.m.	99.5±8.2	n=10

m.m.: motus manus

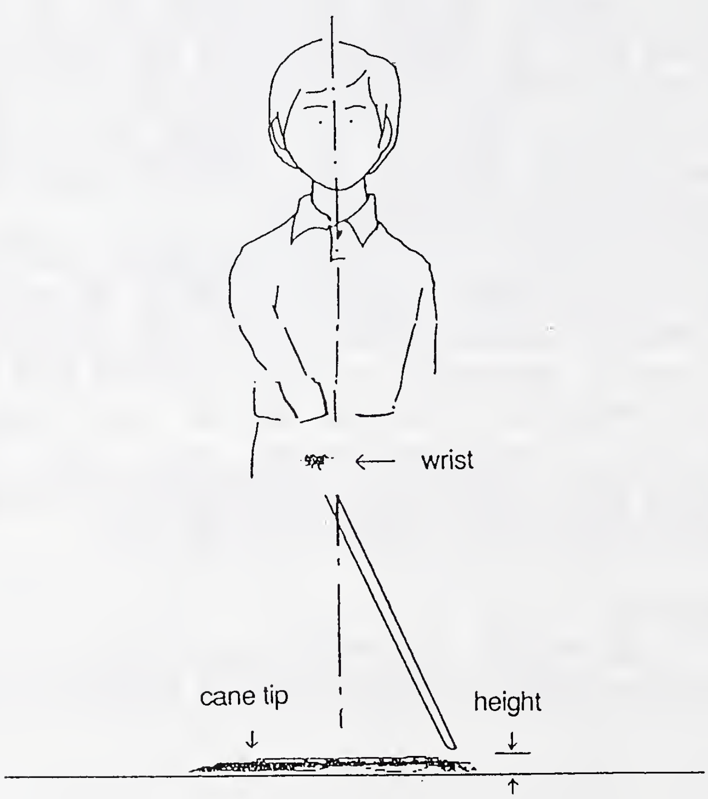

Figure 1. Trajectries of the cane tip and the wrist during a standing position

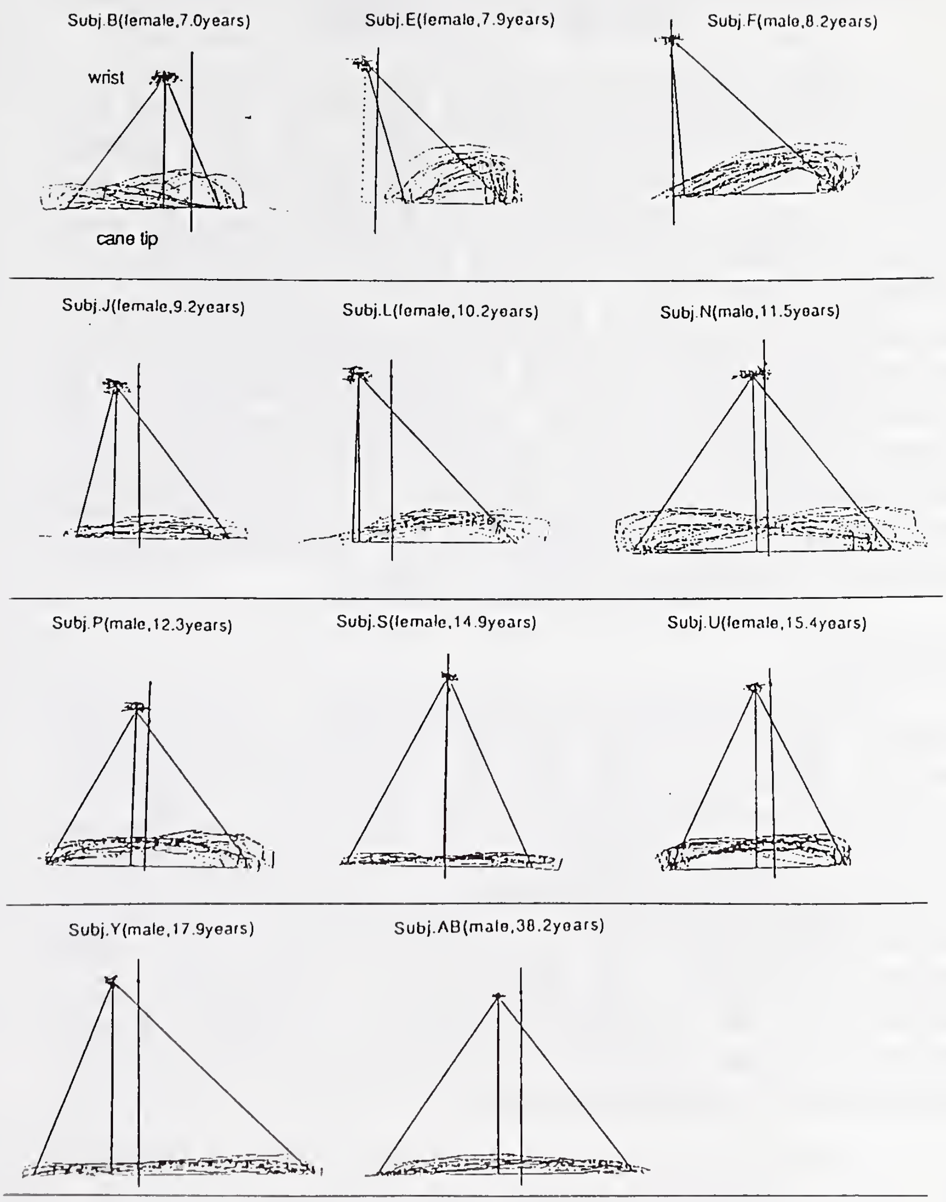

Figure 2. Developmental changes in trajectries of movements of the cane tip and wrist

EFFECTS OF LONG CANE SKILL TRAINING AT STANDING POSITION

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A number of electronic devices have been invented over the last 25 years or so (Dodds, 1993). The most popular mobility aid in Japan, however, is the long cane. The long cane is generally introduced to blind children over 10 years of age and then orientation and mobility training may be started by a specialist at a school for the blind. It remains a question when and how the long cane should be given and prescribed to a blind child. It is considered that there exists a most appropriate age for prescribing a long cane. The purpose of this study was to examine the effects of long cane skill training at standing position in congenitally blind children and to gain insight into the appropriate age for starting orientation and mobility training.

Methods

Fifteen congenitally blind children, 9 males and 6 females, aged from 6.9 to 12.0 years, served as subjects. All subjects, attending a school for the blind, were trained once a week for ten weeks in using the long cane, employing touch technique at standing position. Two out of fifteen subjects, less than eight years in age, had never received the formal orientation and mobility training before. Data analysis was done as reported by Mutaguchi and Nakata(1994) in the present Proceedings of IMC 7. Range and time between swings of the cane, distance of the cane tip from the floor, and the position of the wrist were analyzed.

Results and Discussion

Fig. 1 shows changes in trajectories of movements of the wrist and the cane tip. It was observed that movements of the cane tip were performed to the left of the median line in the first training. It was also found that position of the cane tip was higher than the ideal height of 3 cm. As the training continued, movements became closer to symmetrical ones. Feedback information about movements and height of the cane tip was given to the subject during the training period. Improvement of the long cane skill may be due to the effects of external feedback and proprioceptive inputs.

In order to assess the effects of training on long cane skill, indices of the height of the tip of the cane, range of left and right swing of the wrist, and the position of the wrist were used. Fig. 2 shows each value for the first and tenth training to the ideal values for long cane use. With increased training, values for the tenth training became closer to the ideal ones. Manipulation of long cane needs motor memory. Control of the long cane is to retain distance of the swing from left to right and location of the tip of the cane. Movement of the long cane is also to control a non-visually guided response. Congenitally blind children have never received any visual stimulation nor presumably have had any visual storage capacity. Congenitally blind children, therefore, would be forced to use a proprioceptive storage system for both distance and location information. In this experiment, it was found that long cane skills of congenitally blind children would improve with advancing training. This means that even congenitally blind children could form a non-visual motor program based on proprioceptive and auditory cues through long cane use. In conclusion, it seems possible to start earlier training in long cane use at a school for the blind.

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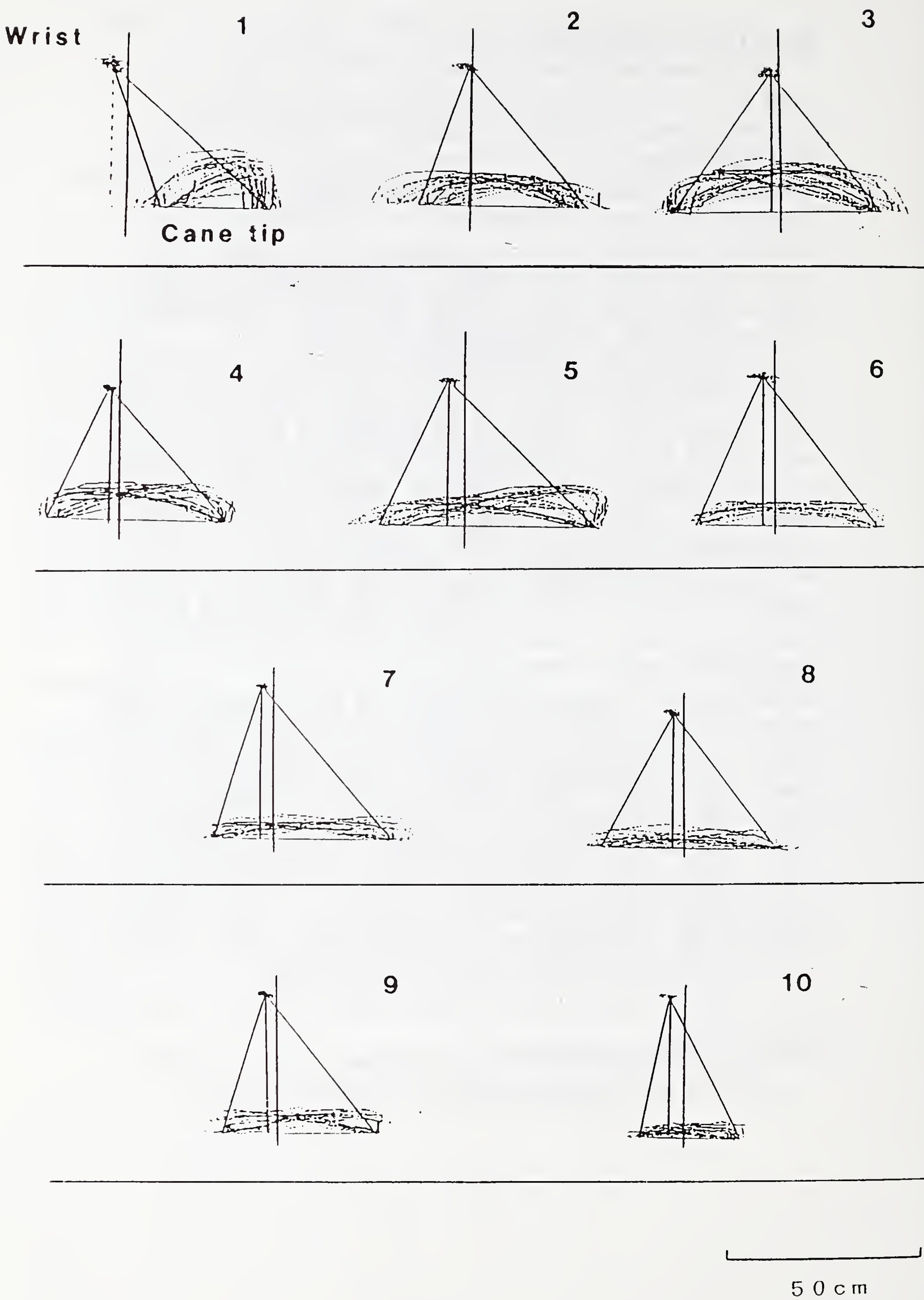

Fig.1 Changes in trajectories of movements of the cane during 10 training periods in a 7.9 year-old congenitally blind girl

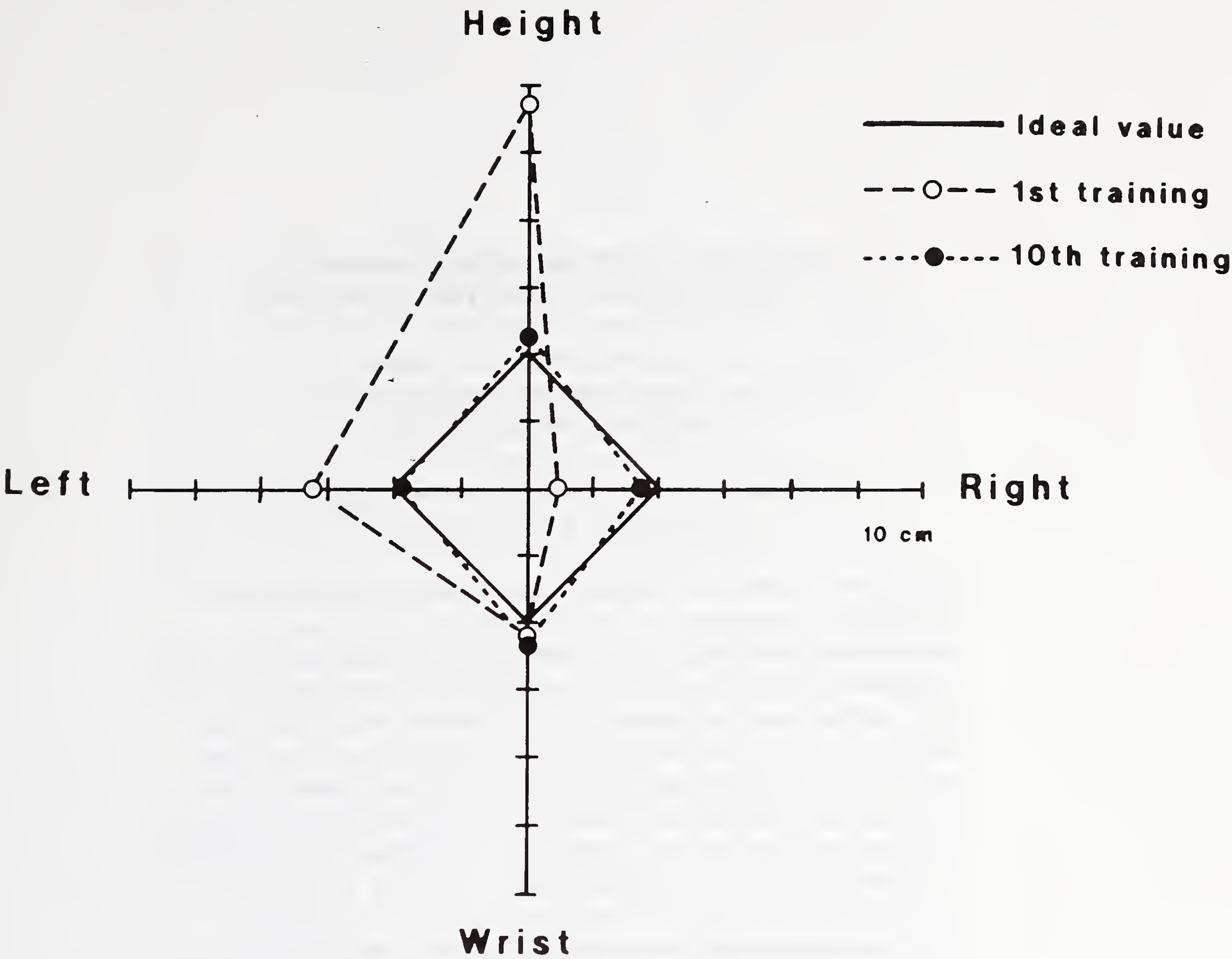

Fig.2 Training effect on long cane skills in a 7.9 year-old congenitally blind girl

BALANCE ABILITY IN VISUAL IMPAIRED AND NORMALLY SIGHTED PEOPLE

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The ability to maintain a balanced posture is essential for independent standing and locomotion. Optimal control of balance requires continuous monitoring of body position. This is achieved by the integration of orientation and motion information from the visual, vestibular and somatosensory systems. Due to the redundancy of information from three systems, a balanced posture can still be maintained when information from one of the sensory systems is missing, as a result of eye closure, for example. In this case the vestibular and proprioceptive information takes over the normally dominant role of vision in balance and posture control. For this reason balancing and walking can be accomplished successfully by blind people. However, if in addition to the loss of visual information the input from the other senses is perturbed, for example by attempting to stand on one leg, ability to maintain balance is severely impaired.

Ability to balance on one foot is, however, most important for walking. In fact, 37% of a normal adult stride is spent in monopedal stance. Altered gait patterns and instability while walking, often found in blind people may thus be explained at least in part by impaired balance due to the loss of visual information and the perturbation of information from the other sensory systems.

It is often thought that people who have some residual vision

have a functional advantage over blind people. While this is true for many tasks, low vision may not be very helpful for the maintenance of balance and posture, and hence stability during locomotion. Decreases in visual acuity and visual fields have previously been found to cause postural instability (Brandt, 1988). The difference in ability to maintain balance in people with low vision and blind people was further investigated in this study. Because we were interested in its relationship with locomotion we tested peoples' balance under conditions that perturbed input from the non-visual senses (standing on tip-toe and standing on one leg).

Three groups of subjects participated in this study: Low vision (21 subjects), blind (11 subjects), normal sight (40 subjects). They participated in four balance conditions:

1. Balancing on the toes of both feet - eyes open
2. Balancing on the toes of both feet - eyes closed
3. Balancing on one leg - eyes open
4. Balancing on one leg - eyes closed

The number of seconds a subject could balance before stumbling or lowering foot/feet to ground was recorded. Trials lasted for a maximum of 30s.

We found that there were no differences in balance ability among people with low vision and blind people in any of the conditions. Balance times were similar in all conditions at an average of about 11s. Normally sighted subjects outperformed both vision impaired groups in all conditions, but their balance was also affected by lack of visual input. When they had their eyes open, they could balance on average for about 27s, with closed eyes they balanced for only 18s.

In conclusion, in situations where sensory input from the

non-visual modalities is perturbed, the ability to balance is negatively affected when a person also has a vision loss. This effect is particularly noticeable in people whose vision loss is caused by a pathology. People who have some small degree of residual vision do not seem to have an advantage over blind people. Closing their eyes, and thus excluding visual information totally, made no difference to their performance, which was generally close to that of blind people. This is in marked contrast to almost every other performance measure in which some vision confers an advantage.

PRESCHOOL O & M DEVICES

Susan Leong

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This poster session will demonstrate a range of mobility devices and orientation aids for vision impaired preschool children. Equipment on show will include:

- AFB Kiddy Cane
- Exceptional Teaching Aids' Pushpal
- T-bar cane with wheels
- PVC rectangular roller cane
- "Bucky", a child's first dog guide
- tactile models

The items will be available for 'hands-on' examination. The presenter will be available to describe their use and value in encouraging early exploration of the environment and travel skills.

BLIND ADULTS' SPATIAL ORIENTATION AFTER WALKS VARYING IN COMPLEXITY: HEADING AND DISTANCE RELATIVE TO THE STARTING POINT AND RELATIVE TO A DISTANT LANDMARK

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The purpose of the study was to assess the accuracy and ease with which persons with visual impairments updated their spatial orientation, relative to both their starting position and to a single, familiar landmark in their surroundings, as a function of the distance and number of turns walked along a route in a gymnasium-sized room.

Participants, 48 adults ranging from 18-59 years of age, were totally blind or had light perception. Half became blind before age 2 and half after age 8. Participants were asked to keep up-to-date on their changing distance and direction relative to a single, to-be-remembered location while walking various routes. Half were asked to keep up-to-date relative to the place from which they started the route. Half were asked to keep up-to-date relative to a known landmark located some distance away from where they started the route. The routes varied in distance, number of turns, and type of turn. At the end of the walk, participants were asked first to judge the direction to the starting location and then to judge the distance to it.

The role of visual experiences early in life along with the implication for orientation and mobility practitioners were discussed.

USE OF RELAXATION AND MENTAL TRAINING IN O&M INSTRUCTION

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It is known that emotional factors are connected with independent travel of the person with visual impairment (Beggs, 1992; O'Donnel, 1988), and stress is considered to be a major probelem in O&M training (O'Donnel, 1988). In order to facilitate learning process during O&M training all efforts must be done to reduce anxiety.

Roessler and Bolton (1978) have argued in their process model that adjustment to visual impairment should be viewed as a continous process of coping. It should be viewed in terms of a person's ability to solve life's problems: an adjusted person solves his or her problems effectively, while a maladjusted person may be overhelmed by them. However, coping with the emotional factors of sight loss and travel is usually left to the traveler with visual impairment. Traditionally O&M instruction has emphasized teaching techniques and the ability to cope with the emotional factors connected to independent travel has not received attention enough.

Genensky, Berry, Bikson & Bikson (1979) found a poor correlation between the amount of training received and the later use of mobility skills by clients, and Gillman and Simon (1980) reported no relationship between instructors' ratings of posttraining skills and the frequency of eventual travel.

Different solutions to cope with stress

Various stress reduction techniques have proven to be useful with other population groups in the past decade. Coaches working with the elite athletes have begun to realize the enermous benefits of mental

training on performance potential. The effects of mental training on skill acquisition and performance is currently emphasized in the study of sport psychology and motor learning. A great deal of research has been generated on topics such as mental imagery, stimulus cueing, biofeedback training and stress management (Ziegler, 1987).

Loehr (1982) has noticed that just as physical fitness and strength are central to competitive performance, so also is mental fitness. Consistently performing one's peak in the heat of competitive battle requires mental strength, a strength that is fundamentally embodied in a core of acquired, learned mental skills. Those skills include concentrating, controlling attitude, managing pressure, thinking right, controlling energy, staying motivated, and visualizing.

O'Donnel (1988) has noticed that very little research has been done to determine the usefulness of problem solving strategies and relaxation techniques in O&M training.

There are several methods used to integrate imagery into O&M training.Imagery has been related to O&M training to help a person with visual impairment better understand the environment, remember routes (Amendola, 1991; Somers, 1990), and reduce stress, anxiety, and fears during O&M lessons (Wagner-Lampl & Oliver, 1988). The goals of the use of imagery are to keep visual memory and imagination active, to develop a highly useful tool for O&M training, and to enhance the manipulative activities of daily living (Amendola, 1991).

When using imagery consciously to improve O&M performance, both cognitive basis and concrete doing are needed (Heikkilä, 1990). Concrete doing can consist of talking, actual performance, and organized rehearsal connected to relaxation. Conscious relaxation is a vital part of the imagery process (Heikkilä, 1990). Learning results (e.g., in generalization) have been better when the person has relaxed consciously and has used mental images. Use of all senses is important in the imagery process.

Usually the single most limiting factor in skill acquisition and performance is found internally - the "I can't" mechanism, and many athletes never reach their potential because they know "they can't do it" (Ziegler, 1987). Therefore the level of selfconfidence is one of the best predictors of competitive success that we can point to. The feelings and the images what one can or can't do strongly determine the outcome. In many ways, maintaining high levels of self-confidence is a skill. Regardless of the level of physical talent and skill, if one has lost the confidence, the performance output will be dramatically affected (Loehr, 1982).

Course Introduction

We believe that there are many similarities between emotional factors which are connected to competitive sport performance and the O&M performance. We also believe that sport psychology can help us to find new aspects when teaching O&M. Based on this background we planned and implemented in August 1993 an intensive O&M course focusing on the use of relaxation and mental training.

The main goals of the course were: a) to create and to strenghten positive attitudes towards independent travel, and to help participants grow awareness of the emotional factors connected to independent travel (we used e.g. the Psycholocigal Performance Inventory, Group Discussions and Positive Suggestions); b) to practice conscious relaxation techniques and to experience a free, relaxed movement through physical exercise (we used e.g. Adaptations of the Jacobson Muscle Relaxation System and the Autogenic Training for Relaxation, Water Aerobics, and Dance); c) to use consciously mental training and imagery when practicing travel skills; d) to strenghten orientation skills (we used sensory training).

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COLOURS BY TOUCH

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Tactile Colour Communication
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1.1 TCC is an innovative system which allows people with a visual disability to perceive printed colours through the use of haptic perception (touch). Allowing people with a visual disability access to colour in this way opens up the possibility of much wider use of diagrammatic and pictographic information transfer, which has, to date been limited to 2-Dimensional raised line diagrams.

Opening the access to colour through texture will magnify the details of information that can be conveyed by illustrations to a level closer to that employed by the visible sense. Similar, and in some cases the same, diagrams and materials can therefore be supplied to sighted and visually impaired people, increasing integration and removing barriers.

1.2 Textural use by people with a visual disability has not been greatly explored and is limited to small amount of use in educational diagrams and tactile maps in buildings. However, the implementation has no standardised procedure or use of techniques, which leaves people with a visual disability at an increased disadvantage.

Haptic perception (touch) has been shown to be both extremely sensitive and lacking in acuity. Coins cannot be identified by the writing on their faces, but rather by their weight (kinaesthetic perception) and shape. Yet touch can distinguish between the skin of a peach and an apple.

1.3 Screen printed textures very versatile. Coloured textures can be printed together on the same sheet to make many copies of a map or illustrated books. They can also be printed in large sheets which can be cut and glued into position to make individual maps or pictures.

TCC is being used to develop an integrated way finding system using coloured and textured maps, signs and markers. This is of particular interest to those working on international standards in the mobility field.

1.4 The system of matching colour and texture is simple and easy to learn. White is very smooth and shiney, black is rough and matt, grey falls between the two. Red, yellow and blue each have their own distinctive textures. The secondary colours of orange, green and purple are textured so as to feel between the appropriate primary colours.

2. WHO NEEDS TCC ?

2.1 Legislation is being passed in all countries to ensure that disable people have equal access to transport and public places. Visually-impaired people require information to make independent journeys. The market needs a product which can be used to solve this problem. TCC will make hard-wearing, visual, tactile maps which can be placed at the entrances of airports, stations, nus terminals, public venues, parks, conference centres, universities, etc. It can also be used to make smaller maps which can be carried.

2.2 Approximately 90% of visually-impaired people do not use Braille. Tactile signs using conventional characters with good colour contrast for people with low vision are needed. Symbols can also be produced using Tactile Colour.

2.3 There is a large market for TCC within education. It includes use in the integrated classroom and in education specifically for the blind. It can be used for people with specially needs who learn kinesthetically as well as the deaf-blind.

2.4 Blind people need identification marks for clothing and other items in daily life.

2.5 Sighted people could make use of TCC in low lighting conditions and in the dark. It will also assist people who are colour blind.

2.6 Blind people can use TCC as an art medium. It can also be used to represent existing pictures and for sighted artists to make artwork for the visually-impaired.

2.7 Many other suggestions have been made for the use of TCC. They can be tried as the product is developed

A STREET TO SHARE

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The educational video shows many typical and real situations encountered by the visually impaired people while travelling in the traffic.

It aims to inform the general public on the "do and don't" and the "how to" when helping such persons.

It represents a good tool for O&M specialists who are promoting safety, prevention, efficiency, elegancy to anyone who helps blind people on the street.

All street users are represented and the author shows a succession of scenarios of real life which help them to visualise the situations and to understand easily the solutions proposed for a good way to help.

This Orientation & Mobility video should be presented to:
- Cars and trucks drivers associations.
- Driving schools.
- Emergency services: ambulance drivers; police department; fire department.
- Cyclists and pedestrians.
- Public services such as: municipalities; highway departments; ministry of transportation; community TV channels.
- Schools and universities.

THE PHOTOGRAPHIC MAP IN SELF FAMILIARIZATION

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LEVESQUE, Alain

CENTRE LOUIS-HEBERT
QUEBEC
CANADA

This is a new approach to teach self familiarization for low vision persons.

As one knows, getting familiar with a new environment can be a time consuming and stressful task for the visually impaired person.

Proceeding with the traditional method, sometimes means several visits on the site to try to "catch" and "learn" clues and landmarks which are often difficult to be perceived precisely, if not totally unseen or which are forgotten or confusing if the time to use them is too long after the visits.

For these reasons, we developed a new technic using photos to show clues and landmarks to the client.

So, they can visualize precisely the new environment and have all the time to memorize its characteristics at home before going in.

Futhermore, while travelling, the client can bring the photos with him on the site and use them as a "pictured map" to check when needed, the landmarks and keeping therefore the right orientation.

This technic optimizes self familiarization by means of several rules and proceedures that we have found and included in the protocol of utilization taught to the client.

THE PHOTO-MAP FOR LOW VISION PERSONS

1. On a new course.

2. Photos are taken by a sighted helper along the way from start to destination in a natural order.

3. The photos are well studied by the low vision person with a color C.C.T.V.

4. Then, the person walks the route refering to the photos and matching them with the real environment by the use of a telescope.

5. The code permitting the photographer to express the orientation on the travel with his pictures is :

   A. To express "a change of direction", take a photo of the street to walk in a perspective viewing manner.

   B. To express "Cross the a street", take a zoomed photo of the name of the street to cross. Choose the side of the street where street signs are most likely to be.

   C. To help the traveler to keep his orientation, take a photo of shop signs between two intersections.

   D. To express that the person is approaching the goal, reserve the three last photos for this purpose :

      - first of the three : take a photo of a sign or a landmark just before the arrival to warn the person he is very close

      - second of the three : take a photo of the destination (address, shopsigns) to tell the person that his on the target

      - last of the three : the destination is past! Take a photo of a sign or a landmark past the goal to warn the person he is over.

   E. Other rules can be taken between the helper ans the LV persone i.e., stairs, button for crossing signals.

6. TIPS FOR THE PHOTOGRAPHER

   We recommend :

   A. To take photos respecting a natural sequence from the starting point to the destination. Arranging the photos in that way will express the orientation of the course, for example :

START (photo perspective)	→	LANDMARK (photo shopsign)	→	STREET TO CROSS (photo name of street)	→	LANDMARK (photo shopsign)	→
CHANGE DIRECTION (photo perspective)	→	LANDMARK (photo shopsign)	→	PRE DESTINATION (photo shopsign)	→	DESTINATION (photo adress)	→
POST DESTINATION (photo landmark)							

B. To avoid "sun glare" an "darkening" on the photos

C. To choose well colored and well lighted landmarks

D. To choose landmarks placed on the natural path for an easy scanning

E. To choose good sized and lenghtly signs as landmarks

F. To choose landmarks which can be seen identical both ways coming and going ie, frontfaced commercial advertising or signs with two identical faces

G. To use if available a zoom to enhance the size of the further targets

H. To process the photos with the "jumbo" format and use mat paper to avoid glare

Try it. It works. Even with persons having vision as low as 20/1500 (Feimbloom Chart).

DOAN VAN HAY, Vincent
MA OM Specialist

Alain LEVESQUE
M.Ed OM Specialist

ISION \ ITEM	START	START. DIRECTION	STREETS TO CROSS	DOUBLE CROSSING	CHANGE DIRECTION	LANDMARKS	LIGHT BUTTON	PRE - DESTINAT.	DESTINATION	POST DESTINAT.	TIME	R: SUCCESS E: FAIL
NOMBRE	1	1	7	1	5	9	1	1	1	1		REMARKS
20/300	R	R	R	R	4 R + 1 Assist	8 R + 1 Echec (1E)	R	R	R	N/A	25mn	
20/320	R	R	R	R	5 R	9 R	R	R	R	N/A	25mn	
20/400	R	R	R	R	5 R	9 R	R	R	R	N/A	25mn	
20/400	R	R	R	R	5 R	9 R	R	R	R	N/A	30mn	
20/450	R	R	R	R	5 R	9 R	R	R	R	N/A	30mn	
20/600	R	R	R	R	4 R + 1 Assist	9 E	R	R	R	N/A	55mn	RESTRICTED FIELD -WAVERING TRAVELER
20/650	R	R	R	R	4 R + 1 Assist	9 R	R	R	R	N/A	N/A	
20/900	R	R	R	R	5 R	9 R	R	R	R	N/A	22mn	VERY ACTIVE AND SELF CONFIDENT SPORTSMAN.
20/1500	R	R	R	R	5 R	7 R + 2 E	R	R	R	N/A	55mn	RATHER OMISSIONS THAN FAILS (2)
TOTAL	100%	100%	100%	100%	SEE REMARKS	SEE REMARKS	100%	100%	100%	100%	SEE REMARKS	AVERAGE TIME 34 mn

Some Cases of Low-vision Travellers Falling from Train Platforms

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1. Introduction

We have been studying accidents of blind travellers falling from train platforms in order to improve their accessibility to public transportation (Murakami et. al., 1989). In this report, we analyze accidents that two low-vision travellers came across.

In general, low-vision people are considered able to walk more safely than the totally blind. However, reliance on remaining visual capability becomes endangering as certain changes occur in lighting conditions resulting in loss of visual control.

2. Method

We interviewed two subjects who fell from train platforms. After the interview we went to the stations where the accidents had occurred and asked the subjects to replay the incidences.

3. Accident case 1

The subject was a 40 year old male whose visual acuity was S.L. in the right eye and 0.01 for the left. One year ago his vision suddenly became worse due to retinal detachment. After the incident, he had the Orientation and Mobility (O&M) training that include the use of trains.

The accident occurred at Akihabara station while commuting to his office at around 8:00 am. Although Akihabara station was not included in his ordinary commuting path, he had to use it that morning as he missed an express train. He, however, knew some details of Akihabara station.

In Akihabara station, Sohbu and Yamanote lines cross at different levels. He arrived at the station by the Sohbu line and went down the stairs to the double-edged platform of the Yamanote line. Fig.1-A shows the inferred walking-path. On the platform he tried to travel from the stairs to point G indicated in Fig.1 -A as it is convenient for him to find the exit at the station to get off.

When he walks on train platforms, he does not use a cane for trailing but watches the edges of the platforms instead. On this day the platform and train tracks were not bright enough for him to find the edge as it was rainy and cloudy. Whilst searching for the edge he fell off the platform at point X in Fig.1-A.

Although warning tactile tiles were installed along the platform edges, he did not realize that he had gone through them. Immediately after the fall a train came in, but he was able to escape to the other side of the platform without any injury.

4. Accident case 2

The subject was a 45 year old female and her visual acuity was about 0.06 in both eyes. She had no demand for the Orientation and Mobility training since she could easily travel by using her remaining vision. Cane carrying is only a symbol. The cause of her visual impairment was congenital cataract.

The accident occurred at Shimokitazawa station around 10:00 am. She wanted to change lines at this pint, and often uses this station.

Fig.1-B shows the inferred walking-path. Along the double-edged platform. When she reached the platform, she thought the train was about to depart and that there was not enough time for her to get on. Therefore she decided to wait for the next train. She was walking parallel to the train when

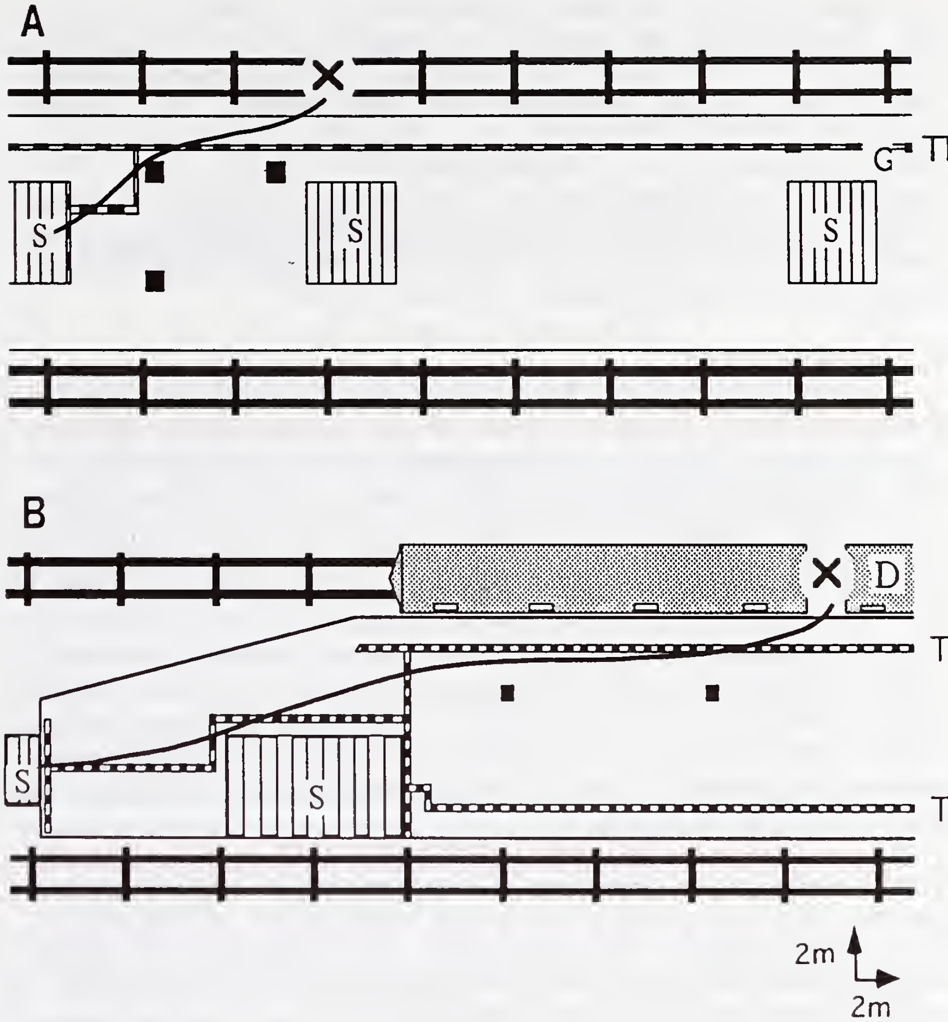

Fig.1 The train platforms at which falls of visually impaired travelers have occurred. A is a platform of Akihabara station and B is of Shimokitazawa station. In the schema A and B, cross (X), filled rectangle (■), S and TT indicate the place of fall, stair, pole supporting roof, and tactile tile respectively. In the schema A, G is the place where the case 1 subject walked toward, and the schema B, D indicates the train door through which the case 2 subject tried to get in.

a woman behind her rushed through door D (shown in Fig.1-B). Seeing this, she decided to quickly get on through the same door. The space she found and thought was the door was, in fact, the gap between 2 cars. The width of the gap was only one half that of train doors. Nevertheless she misunderstood and thought that the doors were coming to a close. This resulted in her falling through, onto the train tracks. A commuter on the platform witnessed the accident and stopped the train to from taking off. Luckily the woman escaped with only a few cut and bruises.

5. Consideration

Generally speaking, low-vision people walk relying on their remaining vision. It is not always necessary for them to use a cane. As long as they depend on the information obtained from their impaired vision, their understanding of the environment may be somewhat hampered. As a consequence, serious accidents by low-vision travellers often occur; as is seen in this report and others (Tauchi et. al. 1991). For this reason, it is necessary for them to use tactile and visual information together. Thus Orientation and Mobility (O&M) training for the blind seems to be the way to improve people with low-vision's mobility. Because the opportunity and/or motivation for low-vision people to receive O&M training is generally low, it is important that O&M training takes this into account.

As described earlier, the use of both tactile and visual cues may be the most effective for the mobility of low-vision people. Improvement of environmental factors is also important. For example, if illumination on the platform is bright enough and shielding panels between cars are installed, the probability of such accidents by the low-vision people shown in this report will be dramatically reduced.

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THE EFFECT OF AGE AND VISUAL IMPAIRMENT ON OUTDOOR MOBILITY

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This study concerned the relationship between self-reported travel frequency among older visually impaired individuals and their performance on a clinical orientation and mobility (O&M) evaluation. Extensive interviews were conducted with older visually impaired persons, younger visually impaired persons, and older persons with normal sight. Data were obtained on the number and types of travel destinations and the types of transportation used. Data included both assisted and unassisted travel. Clinical observational data of O&M abilities was also obtained.

Only six of the 34 older blind persons interviewed reported any independent travel outside their house and yard during the week preceding the interview. Independent travel was reported by approximately twice as many older sighted and younger blind persons as by older blind persons. Older blind persons also reported high degree of dissatisfaction with their level of independence in travel, although very few reported they would be interested in participating in O&M training. For the older group, the key variables related to frequency of independent travel were the presence of sidewalks in the neighborhood and duration of blindness longer than ten years. Clinical O&M skill was unrelated to travel frequency.

EDUCATION OF RREHABILITATION WORKERS FOR THE VISUALLY DISABLED IN JAPAN

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I Introduction

In Japan, we have started a training course for rehabilitation workers for visually disabled persons in 1991. The course to the College of Rehabilitation Center for the Disabled is administrated by The Ministry of Social Welfare.

In other countries, the educational program is divided Orientation & Mobility teaching and Rehabilitation teaching. However, our course program is combined the two subjects ; Orientation & Mobility teaching and Rehabilitation teaching.

II Length of education

1 year

III The number of students admitted per year

10 students

Ⅳ Prerequistes

Educational Background ; BS/BA

Health ; General good health

V Course Curriculum

1 Basic Subjects (346hours)

Introduction to Rehabilitation of Physically Disabled Persons	(14hours)
Introduction to Rehabilitation of Visually Disabled Persons	(32hours)
Psychology of Perception	(28hours)
Psychology of Learning	(14hours)
Developmental Psychology	(16hours)
Fundamentals of Sensory Physiology	(32hours)
Physiology of Eyes	(80hours)
Kinesiology	(18hours)
Geriatry	(14hours)
Internal Medicine of Diabetes	(4hours)
Special Education --Blind Children--	(38hours)
Introduction to Social Welfare	(8hours)
Research Method in the Rehabilitation of Visually Impaired Persons	(24hours)
Statistics in the Rehabilitation of Visually Impaired Persons	(24hours)

2 Professional Subjects (520hours)

Ophthalmology	(18hours)

Psycho-Social Aspects of Visual Impairment	(12hours)
Definition of Visual Impairment, Statistics of Visual Impairment	(16hours)
Motor Skills of Visually Impaired Persons	(14hours)
Information Processing of Visually Impaired Persons --Tactile,Vision, Auditory --	(38hours)
Fundamentals of Low Vision	(18hours)
Aged Persons with Visual Impairment	(8hours)
Multiple handicapped Persons	(22hours)
Instruction and Theory of Orientation & Mobility	(140hours)
Instruction and Theory of Communication Skills	(60hours)
Instruction and Theory of Daily Living Skills	(46hours)
Instruction and Theory of Recreation Activities	(18hours)
Institution, Administration and the right of Visually Handicapped Persons	(14hours)
Low Vision Training	(16hours)
Evaluation and Programming of Training for Visually Disabled Persons	(8hours)
Optics	(24hours)
Introduction to Microcomputer	(16hours)
Use of Microcomputer for Visually Handicapped Persons	(16hours)

The Problems of Orientation & Mobility (8hours)

Training Program for Persons with Diabetic Retinopathy (8hours)

3 Practice (328hours)

Blindfold Training --O & M -- (170hours)

Technical Communication (48hours)

Daily Living Skills Training (72hours)

Recreation Activities Training (12hours)

Low Vision Training (26hours)

4 Student teaching under Supervision (16weeks)

Orientation & Mobility

Communication Skills

Daily Living Skills

Recreation Activities

Low Vision

5 Excursions (8days)

School for the Guide Dogs

School for the Blind Children

Braille Library

Rehabilitation Center

Conference on Rehabilitation for Blind and Visually Impaired Persons

6 Paper

Individual Project and Paper

VI Course Cost

180,000yen (included materials)

The Swedish Drog

a pre-cane mobility aid for Arctic conditions

The drog is a kind of a sledge that is most useful for smaller transports on snow and ice. It has been used in Sweden for hundreds of years. As late as in the 1950's it was quite common to see a delivery boy in a town in northern Sweden pushing his drogsledge. In this part of Sweden the ground is covered by snow from October to May.

A drawing in an encyclopedia printed in 1911 shows that the drog also can be used for leisure activities.

A drog-sledge is always made out of wood. It has four corner posts, two short at the front and two longer ones at the back of the sledge. Behind these poles there is a platform to load on.

Although motorized vehicles have replaced sledges the tradition to make a traditional wooden drog-sledge is still alive in Sweden.

The idea to use a scaled down version of the traditional Swedish drog came up in 1991 when professor Everett Hill gave a course on early O&M intervention. Mrs. Estelle Gyrulf-Nyman was one of the participants in this course. Mrs. Nyman, who is a pre-school counsellor in Stockholm County, knew that one of the children she was serving would soon move to the northern part of the country where ordniary push toys or pre-cane aids made from plastic tubes would not work during the long Arctic winter.

With the assistance of her husband Lage she started to sketch on a pre-cane mobility aid that could be used even if there is a lot of snow on the ground. Quite soon they realized that something looking like their childhood's sledges could be the solution.

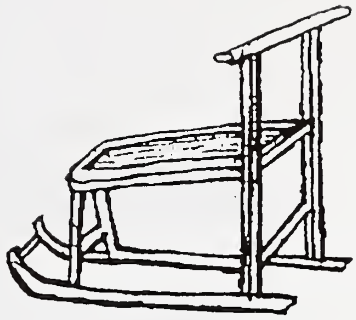
Tomteboda Resource Centre promised to pay for the prototype and Mr. Erling Karlsson, a most competent carpenter living in Lycksele, Lapland, was chosen to build it.

The name drog-sledge comes from "drög" which is the Swedish name for a sledge like this.

The first Swedish Drog for the blind built by Mr. Karlsson has a size to fit a child who is 3-4 years old. The total lenght of the sledge is 90 cm. The height of the 70 cm long handle- bar is about 70 cm, and the platform is about 35x50 cm.

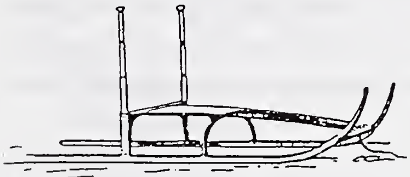
Mr. Lars Karlsson has been using traditional craftsmanship. So are for example the runners made out of a tree that nature has bent. The sledge is painted with linseed oil to keep the structure of the wood visible.

The Swedish Drog shown at IMC-7 in Melbourne is a 1:3 scale model of the original.



The first construction drawing.
When the drog-sledge was built it was fitted with the two front posts as in the traditional drog. The platform was also lowered.

Be careful using the kick-sled



A kick-sled from the 19th century

The kick-sled is common in Sweden, Finland and Norway. There are sleds commercially available in various sizes. An important difference between the drog-sledge and the kick-sled is that the later has metal runners and is very easy to move. Thereby it does not give the visually impaired child an adequate support when moving around. Please observe that the old-fashioned kick-sled on the picture is lacking a horizontal handle-bar which makes this and other similar pre-cane mobility aids very dangerous for blind children.

Social aspects

Using a pre-cane mobility aid like the drog-sledge described here has benefits beyond what it means for the development to be able to move independently. Used when playing with sighted friends the drog can have many positive social implications too.

If you would like to learn more about educational services for visually impaired children and youth in Sweden you can contact

SIH

National Swedish Agency for Special Education
Box 1100
S-871 29 HÄRNÖSAND
Sweden
Tel: +46 611 87770
Fax: +46 611 26866

TRC

Tomteboda Resource Centre
Box 1313
S-171 25 SOLNA
Sweden
Tel: +46 8 151130 (from April 1994 +46 8 4700700)
Fax: +46 8 328819

CLOSING REMARKS
IMC 7 MELBOURNE

Dennis N. Cory, Hamburg Germany

Frequently during the last few days, I have been asked. "What is IMC ? On the surface IMC is as we heard on Monday at the opening session, a group of uncooperative , stubborn O&M instructors. Please allow me to give you the deeper definition of IMC as stated in the IMC handbook:

"IMC is an independent group of practitioners in mobility of the visually handicapped consisting of mobility instructors and mobility centres. Its aim is furthering the level of expertise for mobility instructors through an international exchange of ideas and information".

"IMC is dedicated to co-operation with all organisations of and for the blind. In organising a regular international meeting for mobility instructors, IMC promotes and upgrades mobility services".

"IMC is not a voting body and, therefore, has no delegate system; all interested persons can attend. IMC holds such an International Mobility Conference every two to three years. IMC can be held only in countries that honour all passports".

"IMC started in 1979 in Frankfurt. Subsequently conferences were held in Paris (1981), Vienna (1983), Jerusalem (1986), Veldhoven (1989), Madrid (1991) {and of course, here in Melbourne in 1994}. At these meetings the number of participants has ranged from 90 to 350."

The International Organising Committee is made up of persons who have been instrumental in planning an IMC in the past. Presently the members are Henri Boudet (France), Nurit Neustadt (Israel), Martin van Doorn (Netherlands) and myself.

IMC is taking place at a time in which social, economical and

political changes are extreme throughout the world.
Based in the situation in Europe and specifically in Germany, I wish to share with you my thoughts on the future of IMC. We are confronted with serious problems:

1. Less funding to deal with increasing complex problems in orientation and mobility for visually impaired persons.

2. Reduction in funding for professional preparation in the face of increased demand for qualified personnel.

3. Reduced influence of social sciences in regions torn by civil war, growing rightist radicalism and widespread unemployment.

Each of us is effected by similar national and international developments as we chart our daily course of work. Just as we need to continue O&M services in spite of these problems, we also need to continue and strengthen IMC.

The fall of Berlin Wall and the reunification of Germany are symbolic of an increased dependence on one another in that country. On the International level we experience a similar interdependence. We cannot and should not avoid the international responsibility on our field. We need to support colleagues in developing countries as they strive for a new quality of life and the subsequently higher quality of services. And we need to support ourselves to avoid resignation and professional burn-out.

In all of our countries we have experienced success and a positive development of O&M services. We have experienced set-backs, lack of support, ignorant politicians and depressing economic conditions.

I would ask you to persevere in your own personal situation and to create and maintain international contacts to support other O&M instructors throughout your region and the world. This is the purpose and the spirit to which IMC remains

dedicated. One goal of IMC 6 in Madrid was to involve O&M instructors from Spain and Latin America in our exchange at IMC. The National Organising Committee in Spain was quite successful in this and I am very happy that some participants from Spain and several Latin American countries are here in Melbourne. I might add that just before coming here I received the IMC 6 Proceedings. My congratulations to the Spanish Committee for an excellent job on this.

The decision of the International Organising Committee to hold IMC 7 in Australia met with some disapproval in Europe - distance, cost and time seemed too great. It was, however our goal to open IMC for at least this one time to O&M instructors in this part of the world. The attendance of O&M instructors from Australia, China, Hong Kong, Japan, New Zealand, Papua New Guinea and South Africa here have shown the value of our decision.

IMC - a meeting of O&M instructors intended to further the exchange of knowledge and professional skills - has, in my opinion, once again attained its goal. I wish to convey my thanks to the Australian Organising Committee and in particular to Ms Gayle Clarke for an excellent job. Only those who have organised a conference of this size and complexity can realise the work involved. Perhaps it is no accident, that no country has asked to repeat an IMC.

For a job well done I wish to present Gayle just one flower - a five colour wood print entitled "Iris in an Artic Night" by the German artist Ranulf Streuff. This picture is symbolic of success and survival under the severest of conditions. Gayle, that's what you and your committee have done. Congratulations.

The challenge facing the Norwegian National Organising Committee is clear. I am confident they will meet it. And I look forward to meeting all you in Tondheim, Norway, in May 1996.

IMC 7 Satellite Conference
International Personnel Preparation Centers
Melbourne, Australia
February 5, 1994

Coordinators: Bill Wiener and Everett Hill

9:30 AM -	9:45	Introduction to Satellite Conference - Hill and Wiener
9:45 AM -	10:30	Orientation and Mobility Assistants in the U.S. - Wiener & Hill
10:30 AM -	11:15	Psychological Impediments to Rehabilitation - Alan Dodds
11:15 AM -	12:00	IRIS: A Model Exchange Program - Dennis Cory
12:00 PM -	1:15	Lunch
1:15 PM -	2:00	Interaction Videodisc Project in O&M - Sandra Rosen
2:00 PM -	2:45	Low Vision Assessment and Training - Steve Lagrow
2:45 PM -	3:00	Break
3:00 PM -	4:00	Sharing: New Research, Training Update, and Current Issues
		Open Forum

INTERACTIVE VIDEODISC PROJECT IN ORIENTATION AND MOBILITY

Sandra Rosen, Ph.D.

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San Francisco State University
1600 Holloway Ave.
San Francisco, California
U.S.A.

Purpose

The purpose of this 3-year project is to develop, field-test, and disseminate an interactive videodisc approach to personnel preparation in orientation & mobility (O&M). This innovative approach was developed in response to several critical issues confronting the preparation of O&M specialists:

1. The serious and growing shortage of O&M specialists to serve visually impaired children and adults in many countries
2. The need to integrate technology and innovative teaching methods to enhance the quality of the preservice preparation of O&M specialists

To address these concerns, this project is developing an interactive videodisc instructional program in O&M which includes a written instructional manual and a computer program designed to teach university students basic mobility techniques and skills of observational assessment of performance, identification and correction of incorrect performance, problem-solving and decision-making.

Background

Interactive videodisc was chosen as the medium for this instructional approach due to its proven effectiveness in the preparation of educators (Macy, Klapprodt, Hammer, & Macy, 1987).
It is a system which presents recorded video information under computer control and which allows one to make choices affecting the pace and sequence of the presentation (Floyd & Floyd, 1982; Iuppa, 1984). It has also been shown to be an extremely cost-

effective means of increasing user motivation, achievement of competencies, efficiency of learning, and retention (Carlson & Falk, 1991; Leonard, 1989; Milheim, 1989). Studies have also shown instructional videodisc approaches to education to reduce instructional time in the classroom by an average of 30% over traditional classroom methods (Curtis, 1988). It has been found to be a particularly powerful technology in giving teachers skills such as problem solving and discrimination of appropriate/inappropriate elements of motor skills performance (Kniffen, 1985; O'Sullivan, Stroot, Tennehill, & Chou, 1989; Rule, Salzberg, & Schulze, 1989).

Using interactive video as a means of providing instruction, it is anticipated that this project will have a significant positive impact on the current O&M personnel shortage in the United States and serve as a model for replication in other countries. One reason for the inability of universities to increase the number of professionals they an graduate each year lays in the traditional manner in which O&M specialists are prepared. These methods include simulated learning experiences done under blindfold or low vision simulation. These simulation activities require a low student: teacher ratio in order to ensure the safety of blindfolded students during simulation activities. Until students have completed training and have sufficient experience to instruct, assess, and provide for the safety of a blindfolded partner (or a person with a visual impairment), the university instructor must be available at all times to intervene in the simulation process to provide feedback and to ensure the safety of students. This innovative approach to personnel preparation provides students with the opportunity to learn the correct performance of mobility techniques and to develop skills in observational assessment and identification/ correction of errors in techniques prior to working with a blindfolded partner Field testing has shown that this exposure to mobility techniques prior to learning them in the classroom can enhance the efficiency of the educational process and allow more instructor time to be spent on teaching instructional strategies and related skills instead of techniques. Student feedback from field testing has also indicated that students feel much more comfortable in the simulation and role-playing process after having the opportunity to learn the techniques, identify correct and incorrect

performance, and practice observation and decision-making skills using the videodisc program.

Program Development

Through a review of the literature (Hill & Ponder, 1976; Uslan, Hill, & Peck, 1989) and collaboration with university personnel preparation programs in O&M throughout the United States, a list of standard mobility techniques and commonly accepted alternatives was developed. Approximately 70 mobility techniques are included in the program, divided into six modules: sighted guide, basic travel, residential travel, urban travel, street crossings, and special situations (e.g. crossing railroad tracks). The design for presenting each technique includes providing basic information such as the name and purpose of the technique followed by written step-by-step instructions in how to perform the technique, and a video demonstration of the technique. Students can view the performance as often as desired and can choose to see it in slow motion if they need. After completing this portion of the presentation, students are shown common errors made by individuals with visual impairments as they learn mobility techniques. Students watch a video demonstration of each error and are then given the opportunity to identify and correct the error through interaction with the computer program. A feedback system then either provides the students with positive reinforcement for a correct identification or shows the natural consequence of the error if the students fail to identify and correct the mistake. The system is designed to allow the students to look at the correct and error videos as often as desired during the learning process.

The program is being developed to operate using a laser disc player and a Macintosh computer with CD ROM capability. Plans are to also make it available in DOS format. A written study guide accompanies the computer program. The study guide presents each technique and provides the following information:

1. Name and purpose of technique
2. Prerequisite skills
3. Recommended teaching environments for initial presentation of the technique and for later reinforcement and practice
4. Step-by-step instructions of how to perform the technique

5. Alternative methods of performing the technique and effective modifications in the presence of additional disabilities, age, etc.
6. Teaching strategies
7. Cultural, social, and related considerations

Drawings and photographs supplement the written descriptions.

Efforts completed to date include initial development of the computer program and study guide, and field-testing in university personnel preparation programs. Three universities have participated in field-test efforts to date. Current efforts include additional field-testing and concentrate on program revision based on field-test data and preparation of the program for dissemination within the next 2 years.

Conclusion

This project represents the first use of an interactive video approach to the preparation of O&M specialists. Through minor computer programming variations, the interactive videodisc program can also be extended to use in the preparation of rehabilitation teachers and teachers of the visually impaired. By using selected elements of the program, students in these areas of personnel preparation can develop the same skills as O&M students for teaching appropriate mobility techniques. Similarly, use of selected elements of the program can facilitate the instruction of O&M assistants in the observational assessment of mobility techniques performed by people with visual impairments. Interactive videodisc is also an approach that can be easily replicated and lends itself to curriculum development across a broad array of instructional areas such as lesson preparation and skills of teacher-student interaction.

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LOW VISION ASSESSMENT AND INTERVENTION

Steven J. LaGrow

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Low vision rehabilitation seeks to limit the disability caused by visual impairment by enabling people to use their available vision most effectively. This is often accomplished by manipulating the variables which affect visibility (i.e., light, size, contrast, color and complexity). We are able to determine the effect of manipulation on visibility by observing individual performance (LaGrow, 1986).

Single-case research designs appear to be ideal for this purpose since they provide adequate conditions for making these determinations. The simplest of these designs, the reversal (A-B-A-B), can be used to determine the effectiveness of a given intervention where learning is not the primary factor effecting response on the dependent variable (LaGrow & Murray, 1992). In this case, the dependent measure is observed under two contrasting sets of conditions called phases. The first is the baseline phase (A). During baseline, the subject's performance is measured in the absence of the intervention (i.e., manipulation). Baseline provides the standard with which to measure the effect or change produced by the introduction of the independent variable. The independent variable is introduced in the intervention phase (B). The dependent variable is measured in exactly the same way during this phase. The presence of the independent variable should be the only thing that is different between the two phases (Barlow & Hersen, 1984).

The phases are alternated (i.e., A-B-A-B) to provide a number of opportunities to observe if the presence of the independent variable is indeed controlling the level of response on the dependent variable. The more demonstrations of affect (i.e., A-B-A-B-A-B), the more confident we are that the independent variable truly controls the response on the dependent variable.

No statistics are needed to determine if this control is established. Rather, the raw data is plotted on a graph for the practitioner to determine if it looks like control has been adequately demonstrated.

The utility of the reversal design may be illustrated by investigating the effect of binocularity on localization rate with three visually impaired persons (Kjeldstad & LaGrow, 1986). Localization rates were compared across phases with the subjects using their normally prescribed monocular aid in baseline and a binocular aid of the same power in the intervention phase. As can be seen in Figure One the binocular did result in marked decreases in localization rates for two of the three subjects, and a less impressive reduction for the third.

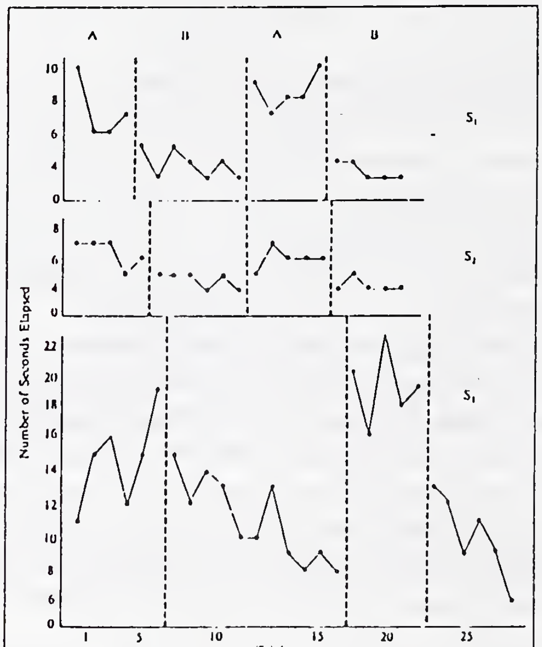

Figure 1. The Relative Effect of Binocular Versus Monocular Telescopic Aids on Number of Seconds Elapsed to Localize and Name Visual Targets Across Three Visually Impaired Subjects.

As can be seen here, this design is adequate for comparing the intervention to baseline but must be modified slightly to allow the practitioner to objectively determine the amount, level or degree of the independent variable to be used as the intervention of choice.

In this case, the practitioner would follow the original baseline (A) phase, with a comparison (B) phase where more than one level of the independent variable is introduced. In this phase, a minimum of three sessions of at least two and no more than four levels or degrees of the independent variable are introduced. The effect each level of the independent variable has on the dependent variable is measured and recorded. The comparison phase is followed by the first (B') intervention phase. This phase is carried out using the level of intervention selected as most appropriate in the comparison phase. The intervention phase is followed by a return to baseline and a subsequent return to intervention.

This design (i.e., an alternating treatment design) was used to determine the power (6X, 8X or 10X) of monocular aid which resulted in the quickest response when reading house numbers, street signs and bus signs by a single, myopic individual (LaGrow, Prochnow-LaGrow, Prisk, Murray, Decker & Brady (1991). As can be seen in Figure Two, the 6X

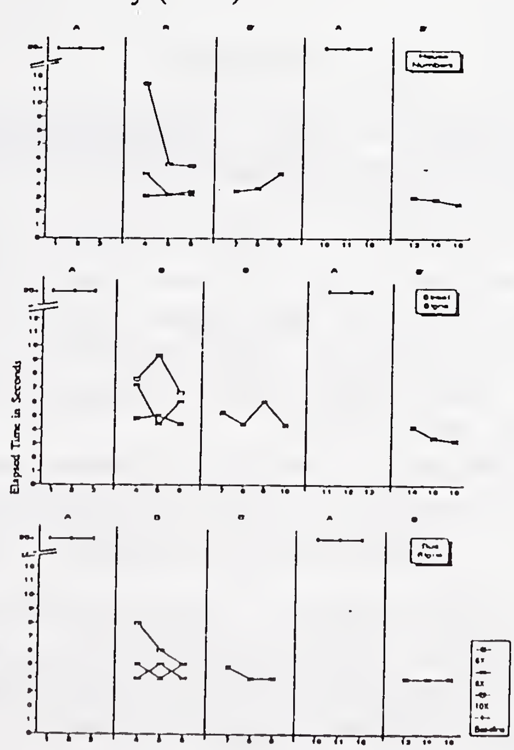

Figure 2. The effects of various powers of magnification on time to correct responding when viewing house numbers, street signs and overhead signs in a bus depot.

and 8X aids proved to be better than the 10X for performing these tasks. The 6X was used as the intervention of choice following the comparison phase since it was the least powerful of the alternatives and therefore would be less likely to present the user with problems of apparent movement (LaGrow, et al., 1991).

Conclusion

Variables affecting visibility may be manipulated to positively affect performance. The affect of manipulation may be assessed using either reversal or alternating treatment designs. These designs are simple to use, need no statistical inference to understand yet provide adequate controls to allow the practitioner to determine if a given intervention is indeed effective, and/or identify the level of intervention which is most effective for a given task.

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Post Conference Workshop Summary
Learned Helplessness in
Children with Visual Impairments

Drs. Margaret Pysh & James Chalfant

This all day workshop explored the definition of Learned Helplessness and its four components: initial expectancies for success or failure; persistence under failure; attributions (beliefs about the causes of success and failure) and future expectancies of success or failure after a failure experience. Participants used the information given to create a profile of a learned helpless client with whom they are currently working. Techniques for diagnosing/assessing learned helplessness characteristics were also presented and then applied by participants.

The final portion of the day was spent sharing strategies and discussions about remediating learned helplessness in several areas including: teaching students how to cope with failure; changing failure expectancies; increasing persistence during failure; and modifying how students think about success and failure.

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